0044015 LK5379

Lockheed Environmental Systems & Technologies Co. Lockheed Analytical Services 975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705 Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146

LOCKHEED MARTIN

October 27, 1995

Ms. Joan Kessner Bechtel Hanford, Inc. 345 Hills P.O. Box 969 Richland, WA 99352

RE: Log-in No.:

Quotation No.:

SAF:

Document File No.: WHC Document File No.:

SDG No.:

L5379

Q400000-B

B95-093

0916596

274

LK5379

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 16 September 1995.

The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements with the exception of method 300.0 nitrate-nitrogen, nitrite-nitrogen, and orthophosphate.

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 375-4741.



Log-in No.: L5379 Quotation No.: Q400000-B

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Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

" I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manger or a designee, as verified by the following signature."

Sincerely,

Kathleen M. Hall

Client Services Representative

cc: Client Services
Document Control

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

## CASE NARRATIVE INORGANIC NON METALS ANALYSES WATER

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

#### **Preparation and Analysis Requirements**

 One water sample was received for LK5379 and analyzed in batches 916 bh and 916 bht for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL#		Method
BOGJY4	L5379-9	DUP	120.1 Conductivity
	L5379-10	DUP	180.1 Turbidity
	L5379-3	MS, DUP	300.0 Chloride, Fluoride, Nitrate-Nitrogen, Nitrite-Nitrogen, Orthophosphate, Sulfate

#### **Holding Time Requirements**

 All samples were analyzed within the method-specific holding time with the exception of Method 180.1 Turbidity, Method 300.0 Nitrate-Nitrogen, Nitrite-Nitrogen and Orthophosphate which were received outside of holding time. The associated samples are flagged with an "H".

#### Method Blanks

 The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

#### **Internal Quality Control**

All Internal Quality Control were within acceptance limits.

Kay McCann Prepared By October 15, 1995

Date

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

## CASE NARRATIVE INORGANIC NON-METALS ANALYSES FILTERED WATER

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

#### **Preparation and Analysis Requirements**

 One filtered water sample was received for LK5379 and analyzed in batch 916 bhd for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL#	Method
BOGJY5	L5379-22	300.0 Chloride, Fluoride, Nitrate-Nitrogen, Nitrite-Nitrogen, Orthophosphate, Sulfate

#### **Holding Time Requirements**

 All samples were analyzed within the method-specific holding time with the exception of Method 300.0 Nitrate-Nitrogen, Nitrite-Nitrogen and Orthophosphate which were received outside of holding time. The associated samples are flagged with an "H".

#### **Method Blanks**

 The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

#### Internal Quality Control

All Internal Quality Control were within acceptance limits.

Kay McCann Prepared By October 15, 1995

Date

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

## CASE NARRATIVE INORGANIC METALS ANALYSES WATERS

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), duplicate sample(s).

#### Preparation and Analysis Requirements

All samples were received on September 16, 1995. The samples were logged in as L5379 and were prepared and analyzed in batch 916 bhT.

#### **Holding Time Requirements**

All samples were analyzed within the method-specific holding times.

#### **Method Blanks**

 The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

#### **Internal Quality Control**

All Internal Quality Control were within acceptance limits.

Shellee McGrath Prepared By October 18, 1995 Date

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

## CASE NARRATIVE INORGANIC METALS ANALYSES FILTERED WATERS

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), duplicate sample(s).

#### **Preparation and Analysis Requirements**

All samples were received on September 16, 1995. The samples were logged in as L5379 and were prepared and analyzed in batch 916 bhD.

#### **Holding Time Requirements**

All samples were analyzed within the method-specific holding times.

#### **Method Blanks**

 The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

#### Internal Quality Control

All Internal Quality Control were within acceptance limits.

Shellee McGrath Prepared By October 18, 1995 Date

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

## CASE NARRATIVE ORGANIC ANALYSES

#### **Analytical Method 413.1**

Analytical Batch 092895-413.1

NOTE:

Sample BOGJY4 (L5379-4) was the native sample used for the Matrix Spike (27944MS) and the Matrix Spike Duplicate (27944MSD). The MS and MSD were analyzed using the duplicate samples BOGJY4 (L5379-5) and BOGJY4 (L5379-6).

The samples were extracted and analyzed within the required holding time on September 28, 1995. Target compound Total Oil and Grease was not detected in the Method Blank (MB). The recovery of Total Oil and Grease was within QC limits in the MS, MSD, and Laboratory Control Sample (LCS). The Relative Percent Difference (RPD) between the MS and MSD recoveries was within QC limits.

#### Analytical Method 418.1

Analytical Batch 092695-418.1

NOTE:

Sample BOGFV2 (L5351-4) was the native sample used for the 27753MS/MSD. The MS and MSD were analyzed using the duplicate sample BOGFV2 (L5351-5).

The samples were extracted within the required holding time on September 25, 1995 and analyzed within the required holding time on September 26, 1995. All initial and continuing calibrations were within QC criteria. Total Recoverable Petroleum Hydrocarbon (TRPH) was not detected in the MB. A LCS and Laboratory Control Sample Duplicate (LCSDUP) were extracted and analyzed in addition to a MS and MSD. The recovery of TRPH was within QC limits in the MS, MSD, LCS and LCSDUP. The RPDs between the MS/MSD and LCS/LCSDUP recoveries were within QC limits.

Christine Davy
Prepared By

October 19, 1995 Date

Log-in No.: L5379

Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

## CASE NARRATIVE RADIOCHEMICAL ANALYSES

The routine calibration and quality control (QC) analyses performed for this batch include as applicable: instrument calibration, initial and continuing calibration verification, quench monitoring standards, instrument background analysis, method blanks, yield tracer, laboratory control samples, matrix spike samples, duplicate samples.

NOTE:

Chemical recoveries and minimum detectable activities (MDAs) can be found on the preparation sheets and calculation sheets on the attached raw data for each method.

#### **Holding Time Requirements**

All holding times were met.

#### **Analytical Method Gamma Spectrometry**

The gamma spectrometry analysis was performed using standard operating procedure (SOP), LAL-91-SOP-0063. The samples were analyzed in workgroup 27809. No problems were encountered during the analysis and all QC criteria were met. No re-analyses were performed.

#### Analytical Method Gross Alpha/Beta

The gross alpha/beta analysis was performed using SOP, LAL-91-SOP-0060. The samples were analyzed in workgroup 27812. No problems were encountered during the analysis and all QC criteria were met with the following exception: The MDA exceeded the reporting detection limit due to the residue weight limitations forcing a volume reduction, the associated samples were flagged with a "C" qualifier. No re-analyses were performed.

#### **Analytical Method Strontium-90**

The strontium-90 analysis was performed using SOP, LAL-91-SOP-0196. The samples were analyzed in workgroup 27451. No problems were encountered during the analysis and all QC criteria were met. No re-analyses were performed.

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SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

#### **Analytical Method Tritium**

The tritium analysis was performed using SOP, LAL-91-SOP-0066. The samples were analyzed in workgroup 27851. No problems were encountered during analysis and all QC criteria were met. No re-analyses were performed.

Andrea Tippett Prepared By October 17, 1995 Date

## LOCKHEED ANALYTICAL SERVICES LOGIN CHAIN OF CUSTODY REPORT (1n01) Sep 18 1995, 08:49 pm

Login Number: L5379
Account: 596 Bechtel Hanford, Inc. \* Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Num	ber			Ç	lient ample Nu	mber	Ç D	ollest ate	Receive Date PR	Due Date
L5379-1 temp 2; SA	F#	B95	5-093		OGJY4		1	4-SEP-95	16-SEP-95	21-OCT-95
Location: Water			SCRI	EEN	ING		Hold:1	L2-MAR-96		
L5379-2 temp 2; SA Location:		B95	5-093		OGJY4		1	L4-SEP-95	16-SEP-95	21-0CT-95
Water	1	S	6010	נ כ	CP METAI	່ເຮ	Hold:	12-MAR-96		
L5379-3 temp 2; SA Location:	AF# 157	B95	5-09:		30GJY4		1	L4-SEP-95	16-SEP-95	21-OCT-95
Water Water	1	s	300	. 0	CHLORIDI FLUORIDI		Hold:	12-OCT-95 12-OCT-95		
Water Water	1	S	300	. 0	NITRATE NITRITE	n ==	Hold:	16-SEP-95 16-SEP-95 16-SEP-95		
Water Water	1 1				PHOSPHATE SULFATE	re		12-0CT-95		
L5379-4 temp 2; Si Location:				3	30GJY4				16-SEP-95	21-OCT-95
Water	1	S	413	. 1	OIL AND	GREASE	Hold:	12-0CT-95		
L5379-5 temp 2; S Location:			5-09	-	BOGJY4		;	14-SEP-95	16-SEP-95	21-OCT-95
L5379-6 temp 2; S Location:			5-09		BOGJY4			14-SEP-95	16-SEP-95	21-OCT-95
L5379-7 temp 2; S Location:			5-09		BOGJY4			14-SEP-95	16-SEP-95	21-OCT-95
L5379-8 temp 2; S Location:	AF#	,B9	5-09		BOGJY4			14-SEP-95	16-SEP-95	21-OCT-95
Water	1		418	. 1	TPH		Hold:	12-OCT-95	5	

### LOCKHEED ANALYTICAL SERVICES LOGIN CHAIN OF CUSTODY REPORT (1n01) Sep 18 1995, 08:49 pm

Login Number: L5379
Account: 596 Bechtel Hanford, Inc. \* Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Client Sample Number Sample Num	Collect Receive mber Date PR	Due Date
L5379-9 B0GJY4 temp 2; SAF# B95-093	14-SEP-95 16-SEP-95	21-OCT-95
Location: 157 Water 1 S 120.1 CONDUCTIV	VITY Hold:12-OCT-95	
L5379-10 B0GJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95	21-OCT-95
Water 1 S 180.1 TURBIDIT	Y Hold:16-SEP-95	
L5379-11 BOGJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95	21-OCT-95
Water 1 S 9040 PH	Hold:21-SEP-95	
L5379-12 B0GJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95	21-OCT-95
Water 1 S GAMMA SPEC LAL Water 1 S GR ALP/BETA LA Water 1 S SR-90 LAL-0196	L-0060 Hold:12-MAR-96	
L5379-13 BOGJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95	21-OCT-95
L5379-14 B0GJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95	21-OCT-95
L5379-15 B0GJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95	21-OCT-95
L5379-16 BOGJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95	21-OCT-95
L5379-17 BOGJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95	21-OCT-95

### LOCKHEED ANALYTICAL SERVICES LOGIN CHAIN OF CUSTODY REPORT (ln01) Sep 18 1995, 08:49 pm

Login Number: L5379
Account: 596 Bechtel Hanford, Inc. \* Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Client Sample Number Sample Number	Collect Receive Due Date Date PR Date
L5379-18 BOGJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95 21-OCT-95
L5379-19 B0GJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95 21-OCT-95
L5379-20 BOGJY4 temp 2; SAF# B95-093 Location: 157	14-SEP-95 16-SEP-95 21-OCT-95
Water 1 S TRITIUM(H3) LAL-0066  L5379-21 BOGJY5  temp 2; SAF# B95-093  Location: 157  Filt H20 15 S 6010 ICP METALS	14-SEP-95 16-SEP-95 21-OCT-95 Hold:12-MAR-96
L5379-22 BOGJY5 temp 2; SAF# B95-093 Location: 157 Filt H20     15 S 300.0 CHLORIDE Filt H20     15 S 300.0 FLUORIDE Filt H20     15 S 300.0 NITRATE Filt H20     15 S 300.0 NITRITE	14-SEP-95 16-SEP-95 21-OCT-95 Hold:12-OCT-95 Hold:12-OCT-95 Hold:16-SEP-95 Hold:16-SEP-95
Filt H20 15 S 300.0 PHOSPHATE Filt H20 15 S 300.0 SULFATE  L5379-23 REPORT TYPE	Hold:16-SEP-95 Hold:12-OCT-95 16-SEP-95 16-SEP-95 21-OCT-95
SAF# B95-093 Location: Water 1 S EDD - DISK DEL.	

Page 3		
Signature: _	simil	
Date:	9-18.45	
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310

#### Lockheed Analytical Laboratory SAMPLE SUMMARY REPORT (su02) Bechtel Hanford, Inc. \* Richland, WA

Client Sample Number	LAL Sample Number	SDE Number Matrix	Method
BOGJY4 —	L5379-1 L5379-2 L5379-3 L5379-3 L5379-3 L5379-3 L5379-4 L5379-9 L5379-9 L5379-10 L5379-11 L5379-12 L5379-12 L5379-12 L5379-12	Water	SCREENING - 6010 ICP METALS 300.0 CHLORIDE 300.0 FLUORIDE 300.0 NITRATE - 300.0 NITRITE - 300.0 PHOSPHATE 300.0 SULFATE - 413.1 OIL AND G 418.1 TPH - 120.1 CONDUCTIV 180.1 TURBIDITY 9040 PH - GAMMA SPEC LAL- GR ALP/BETA LAL SR-90 LAL-0196 TRITIUM(H3) LAL
BOGJY5 _	L5379-21 L5379-22 L5379-22 L5379-22 L5379-22 L5379-22 L5379-22	Filt H20 Filt H20 Filt H20 Filt H20 Filt H20 Filt H20 Filt H20	6010 ICP METALS 300.0 CHLORIDE- 300.0 FLUORIDE- 300.0 NITRATE- 300.0 PHOSPHATE 300.0 SULFATE-
REPORT TYPE ~	L5379-23	Water	EDD - DISK DEL

Bechtel Hanford, Inc	;.	СН	AIN OF CUSTO	TODY/SAMPLE ANALYSIS REQUEST					5	Page 1 of 2 Data Turnaround				
Collector	<del>,</del>		Company Contact								Priority			
Collector AL RIZZO	MONTY.	Mechorn	J. V. Borghese					(509) 372				Normal		
Project Designation	•		Sampling Location					SAF No.			-4:			
100-NR-2 Groundwater Sar	npling - Round &	3	100 N					B95-093						
Ice Chest No.	-		Field Logbook No.	FL-1056	•			Federal Ex	Shipment					
Shipped To	<del></del>		Offsite Property No.	72 703 6	·				ing/Air Bill (	No.			<del></del>	
Lockheed	•		W9	15-0-	0204	1-50				<b>390</b>	24640	78 S		
Possible Sample Hezards/Re	emarks	_	Preservation	HNO <sub>3</sub>	T	Cool 4°C	H₂SO₄	Cool 4°C	Cool 4°C		HNO <sub>3</sub>	None	None	
		<del></del>	Type of Container	P/G	P/G	G	G	P/G	P/G	Р	P/G	G	P/G	
			No. of Container(s)	1	1	4	1	1	1	1	8	1	1	
Special Handling and/or Sto			Volume	500mL	500mL	11,	1L	250mL	250mL	250mL	11.	500mL	20mL	
Maintain samples between 2°C and 6°C.  SAMPLE ANALYSIS				ICP Metals - TAL (Unfilter- ed)	Anions (IC) - F, Cl, SO <sub>4</sub> , PO <sub>4</sub> , NO <sub>2</sub> , NO <sub>3</sub> (Unfiltered)	Oil and Grease	ТРН	Conduct- ivity	<b>!</b>	рĦ	Gross Alphs, Gross Bete, Sr-90, Geruma Spec	Tritium	Activity Scan	
2.4014.10 10	Matrix *	Date Sampled	Time Sampled				·			,	, <u></u>	γ	· · · · · ·	
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							<u> </u>			<u> </u>			<u> </u>	
Relipcuished By STEVEN BY CONTROL 1515  Relipcuished By STEVEN BY CONTROL 1515  Records By STEVEN BY CONTROL 1515					SPECIAL INSTRUCTIONS  Sample analysis for phosphate, nitrate, and nitrite by EPA 300.0; pH by  SW-846 9040; and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the holding times will not be met.  Metrix*  S = Soil SE = Sodiment SO = Solid SL = Sludge W = Water							diment Xid udge		
	Date/Time  Hew 7-15  Date/Time	Received By	Date/Ti									DL - Di	t um Solds um Liquids	
Relinquished By	Date/Time									T = Tissue Wt = Wipe L + Liquid V + Vegetation X = Other				
LABORATORY Receiv		4 of	Title Somple (n	chedia	·					ate/Time	10120			
· · · · · · · · · · · · · · · · · · ·	sal Method			Di	sposed By					ete/Time				

Bechtel Hanford, Inc		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST										Page 2 of 2.			
Collector AL PIZZO	Company Contact							·	,	☐ Priority ■ Normal					
Project Designation	THOIOTY.	MEUNCAGO	J. V. Borghese Sampling Location					(509) 37 SAF No.			<u> </u>				
100-NR-2 Groundwater San	pling - Round	18	100 N					B95-093							
Ice Chest No.  ER-15			Field Logbook No.	_				Federal E	of Shipmen						
Shipped To Lockheed			044 0	v95- (	מגט-נ	74- E	0	Bill of La	ding/Air Bill	<sup>№</sup> . 29	04640	785			
Possible Sample Hazards/Re	marks		Preservation	HNO₃	Cool 4°C					T	T				
			Type of Container	P/G	P/G					T					
			No. of Container(s)	1	1										
Special Handling and/or Sto Maintain samples between :			Volume	500mL	500mL										
SAMPLE ANALYSIS				ICP Metals - TAL (Filtered)	Anions (IC) - F, Cl, SO <sub>4</sub> , PO <sub>4</sub> , NO <sub>2</sub> , NO <sub>3</sub> (Filtered)										
Sample No	Matrix *	Date Sampled	Time Sampled		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		<del></del>		<u> </u>	<del></del>		T		
Berust	w	9/14/95	1355	X	X			<u> </u>		<u> </u>	<u> </u>		<u> </u>		
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	<u></u>			-				+		1	<del>                                     </del>				
CHAIN OF POSSESSION		Sign/Print			SPECIAL INSTRUCTIONS Sample analysis for phosphate, nitrate, and nitrite by EPA 300.0						are being S = Soil				
Relinquished By Teven Grand Date/Time 1515 Received By Date/Time Date/Time Date/Time Date/Time Date/Time Date/Time Received By Date/Time Received By Date/Time Received By Date/Time Received By Date/Time				me							SO = Solid SL = Studge W = Water O = Oil A = Air DS = Drum Solids OL = Drum Liquids T = Tissue W = Wiyes				
Relinquished By	Date/Time	Received By	Date/Ti	me					·	Data/Time		L + Liqu V - Veg X - Oth	uid gatation		
LABORATORY Receive SECTION	ed By	Mentel	Title Sayle Cu,						4.	Date/Time - / 6 · 95	10920				
FINAL SAMPLE Dispose	al Method		··-		posed By					Date/Time	<i>1</i>				

Job No. 22192
Writing Response Required: NO
CCN: N/A
OU: 100-NR-2
TSD: N/A

TSD: N/A ERA: N/A Subject Code: 5850

TO:

W. S. Thompson

N3-06

DATE: July 18, 1995

COPIES:

R. L. Biggerstaff

H4-91

FROM: S. K. De Mers

Radiological Controls T7-05/373-1913

SUBJECT:

1995 sampling 100-NR-2

There is no need to perform total activities prior to offsite shipment to NRC licensed labs of samples taken from the list of wells in Attachment 1.

All of the wells listed in the first attachment were reviewed for radiological content based on the previous 4 years of sampling data. No well listed has a  $\beta$  activity in excess of 100,000 pCi/l (<.1 uCi/sample based on a 1 liter sample size) nor any  $\alpha$  activity in excess of 10,000 pCi/l (<.01 uCi/l based on a 1 liter sample). All wells show activities < 2,000 pCi/gm (< 2 nCi/gm D.O.T. limit). The highest activity in recent samples is 3,260 pCi/l  $\beta$  and 5.2 pCi/l  $\alpha$ .

The remaining wells are in locations that may have a credible path whereby they could become contaminated at the above listed levels and therefor will need to have total activities run on them prior to shipment. Radiological monitoring will be required for the wells and seeps listed in Attachment 2.

Radiological monitoring during sampling will only be required for the wells in Attachment 1, if the wells are located in radiological areas or if the wells themselves are labeled with radiological stickers. Monitoring requirements for down hole work such as pump removal will be determined based on the history of each well on a case by case basis.

skd

#### **ATTACHMENT 1**

#### WELLS THAT DO NOT REQUIRE TOTAL ACTIVITIES

<u>Wells</u>
199-N-14
199-N-75
199-N-29
199-N-2
199-N-3
199-N-31
199-N-46
199-N-67
199-N-76
199-N-16
199-N-17
199-N-18
199-N-19
199-N-20
199-N-21
199-N-25
199-N-26
199-N-32
199-N-50 199-N-51
199-N-51 199-N-54
199-N-54 199-N-64
199-N-66
199-N-67
199-N-70
199-N-71
199-N-73
199-N-74
199-N-75
199-N-77
199-N-80

# LOCKHEED MARTIN

#### Sample Login Login Review Checklist

Lot Number <u>L5379</u>

The login review should be conducted by that person logging in the samples as well as a peer. Please use this checklist to ensure that such reviews occur in a uniform basis. Please sign and date below to verify that a login review has occurred. This checklist should be affixed to each login package prior to distribution.

For effective login review, at a minimum, five reports form the login process are required. These are the COC (or equivalent), the login COC report, the sample summary report, the sample receiving checklist, and the login quotation. Before beginning review, ensure that these five components are available. Jobs with single component samples, the sample summary report may be omitted.

YES	NO	<u>N/A</u>	Comment
<u> </u>			
$\overline{\chi}$	_		
K	_		
$\frac{1}{\lambda}$			
X			
$\overline{\chi}$			
<u>YES</u>	<u>NO</u>	<u>N/A</u>	Comment
X	_	_	
		7	
<u>YES</u>	NO	N/A	Comment
<del></del>		<u>x</u>	
LM ;	U signatur	•	9-1845 916 596 02
	YES YES  Lm;	X	x x

## **SAMPLE CHECK-IN LIST**

Date/Time Received: $9 - 1695 / 6930$ SDG#: $\sqrt{2}$	14		<del></del>	
fork Order Number: SAF #: <u>B9</u>	5-0	93.	<u>.                                    </u>	
Shipping Container ID: <u>FQ-15</u> Chain of Custody #	Nh	·		
Custody Seals on shipping container intact?	Yes	×	No	[]
Custody Seals dated and signed?	Yes	N	No	[]
3. Sample temperature $2^{\circ}$				
1. Vermiculite/packing materials is	Wet	[ ]	Dry	M
5. Each sample is in a plastic bag?	Yes	$\bowtie$	No	[]
5. Sample holding times exceeded?	Yes	[<]	No	[]
8. Samples are:  yin good condition broken		1s 		
9. Is the information on the COC and Sample bottles in  Yes[\] No []  Notes:	agreen	ent?		
Sample Custodian/Laboratory: Mem & Date:  Telephoned To: Kurller   Date: On 9-18-85 By			11.	
resephoned to: Kurkhan 1/2/1 on 1/0 70 by	Julio	ALC	112	

## Lockheed Analytical Services Sample Receiving Checklist

Client Name: Balte - Hanton	Job No.	L5379	Cooler ID:	
COOLER CONDITION UPON RECEIPT				
Temperature of cooler upon receipt:	2°C			ļ
temperature of temp. blank upon receipt:	· · · · · · · · · · · · · · · · · · ·			
	Yes	No	Comments/Discrepancies	
custody seals intact	Y			
chain of custody present				
blue ice (or equiv.) present/frozen	Ŷ -		· · · · · · · · · · · · · · · · · · ·	
rad survey completed	X			
SAMPLE CONDITION UPON RECEIPT				
	Yos	No	Comments/Discrepancies	
all bottles labeled	χ			
samples intact	λ			
proper container used for sample type	Ý			
sample volume sufficient for analysis	χ̈́			
proper pres indicated on the COC	Ϋ́			
VOA's contain headspace			UVI	
are samples bi-phasic (if so, indicate sample ID'S):			NIL	
MISCELLANEOUS ITEMS				
	Yes	No	* Comments/Discropancies	
samples with short holding times		χ		
samples to subcontract	· · · · · · · · · · · · · · · · · · ·	<u>′</u>		
		<u> </u>		
ADDITIONAL COMMENTS/DISCREPANCIES				
	•			
	•			
and the state of t		<u> </u>		
	18-95			
Sent to the client (date/initials):		** Client's	signature upon receipt:	
Notes: * = contact the appropriate CSR of any discrepancies immediate	aly upon receipt			
** = please review this information and return via facsimilie to the ap	proprieto CSR (702) 361-	<b>3</b> 146		

#### COMMON IONS AND ADDITIONAL ANALYTES

Client Sample ID: BOGJY4	Date Collected: 14-SEP-95
Matrix: Water	Date Received: 16-SEP-95

Constituent:	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Specific Conductance	uS/cm	120.1	1100	1		26-SEP-95	27575	L5379-9
Turbidity	NTU	180.1	0.64	N/A	Н	23-SEP-95	27708	L5379-10
Chloride	mg/L	300.0	20.	0.02		20-SEP-95	27576 ,	L5379-3
Fluoride	mg/L	300.0	< 0.1	0.1		20-SEP-95	27578	L5379-3
Nitrate-N	mg/L	300.0	8.1	0.02	Н	20-SEP-95	27580	L5379-3
Nitrite-N	mg/L	300.0	< 0.01	0.01	н	20-SEP-95	27582	L5379-3
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	н	20-SEP-95	27584	L5379-3
Sulfate	mg/L	300.0	300	1	D(1:10)	20-SEP-95	27586	L5379-3
рн	pH Units	9040	7.8	0.1	Н	22-SEP-95	27656	L5379-11

#### COMMON IONS AND ADDITIONAL ANALYTES

Client Sample ID: BOGJY5	Date Collected: 14-SEP-95
Matrix: Filt H20	Date Received: 16-SEP-95

, i i i i	Units	Method	Result	Reporting Det Limit	Data Qualifien(s)	Date Analyzed	LAS Batch ID	LAS. Sample ID
Chloride	mg/L	300.0	20.	0.02		20-SEP-95	27577	L5379-22
Fluoride	mg/L	300.0	< 0.1	0.1		20-SEP-95	27579	L5379-22
Nitrate-N	mg/L	300.0	8.3	0.02	н	20-SEP-95	27581	L5379-22
Nitrite-N	mg/L	300.0	< 0.01	0.01	н	20-SEP-95	27583	L5379-22
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	н	20-SEP-95	27585	L5379-22
Sulfate	mg/L	300.0	300	1	D(1:10)	20-SEP-95	27587	L5379-22

Client Sample ID: BOGJY4	Date Collected: 14-SEP-95
Matrix: Water	Date Received: 16-SEP-95
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit	Data Qual	Dilution	Date Analyzed	LAS Batch ID	LAS Sample ID
ALUMINUM, TOTAL	mg/L	6010	0.035	0.029	В	1	16-0CT-95	27912	L5379-2
ANTIMONY, TOTAL	mg/L	6010	< 0.058	0.058		1	16-0CT-95	27912	L5379-2
ARSENIC, TOTAL	mg/L	6010	< 0.098	0.098		1	16-0CT-95	27912	L5379-2
BARIUM, TOTAL	mg/L	6010	0.030	0.021	В	1	16-0CT-95	27912	L5379-2
BERYLLIUM, TOTAL	mg/L	6010	< 0.0010	0.0010		1	16-OCT-95	27912	L5379-2
CADMIUM, TOTAL	mg/L	6010	< 0.0050	0.0050		1	16-0CT-95	27912	L5379-2
CALCIUM, TOTAL	mg/L	6010	82.	0.032	-,	1	16-0CT-95	27912	L5379-2
CHROMIUM, TOTAL	mg/L	6010	0.0043	0.0030	В	1	16-0CT-95	27912	L5379-2
COBALT, TOTAL	mg/L	6010	< 0.0060	0.0060		1	16-0CT-95	27912	L5379-2
COPPER, TOTAL	mg/L	6010	< 0.0030	0.0030		1	16-0CT-95	27912	L5379-2
IRON, TOTAL	mg/L	6010	0.15	0.012		1	16-0CT-95	27912	L5379-2
LEAD, TOTAL	mg/L	6010	< 0.056	0.056		1	16-0CT-95	27912	L5379-2
MAGNESIUM, TOTAL	mg/L	6010	17.	0.050		1	16-0CT-95	27912	L5379-2
MANGANESE, TOTAL	mg/L	6010	0.0042	0.0020	В	1	16-0CT-95	27912	L5379-2
NICKEL, TOTAL	mg/L	6010	< 0.015	0.015		1	16-0CT-95	27912	L5379-2
POTASSIUM, TOTAL	mg/L	6010	7.4	0.60		1	16-0CT-95	27912	L5379-2
SELENIUM, TOTAL	mg/L	6010	< 0.087	0.087		1	16-0CT-95	27912	L5379-2
SILVER, TOTAL	mg/L	6010	< 0.0040	0.0040		1	16-0CT-95	27912	L5379-2
SODIUM, TOTAL	mg/L	6010	150	0.070		1	16-0CT-95	27912	L5379-2
THALLIUM, TOTAL	mg/L	6010	0.075	0.050	В	1	16-0CT-95	27912	L5379-2
VANADIUM, TOTAL	mg/L	6010	0.0080	0.0040	В	1	16-0CT-95	27912	L5379-2
ZINC, TOTAL	mg/L	6010	0.019	0.0040	В	1	16-OCT-95	27912	L5379-2

Client Sample ID: BOGJY5	Date Collected: 14-SEP-95
Matrix: Filt H20	Date Received: 16-SEP-95
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit		Dilution	Date Analyzed	LAS Batch ID	LAS Sample ID
ALUMINUM, DISSOLVED	mg/L	6010	0.039	0.029	В	1	16-0CT-95	27913	L5379-21
ANTIMONY, DISSOLVED	mg/L	6010	< 0.058	0.058		1	16-0CT-95	27913	L5379-21
ARSENIC, DISSOLVED	mg/L	6010	< 0.098	0.098		1	16-0CT-95	27913	L5379-21
BARIUM, DISSOLVED	mg/L	6010	0.030	0.021	В	1	16-OCT-95	27913	L5379-21
BERYLLIUM, DISSOLVED	mg/L	6010	< 0.0010	0,0010		1	16-0CT-95	27913	L5379-21
CADMIUM, DISSOLVED	mg/L	6010	< 0.0050	0.0050		1	16-0CT-95	27913	L5379-21
CALCIUM, DISSOLVED	mg/L	6010	90.	0.032		1	16-0CT-95	27913	L5379-21
CHROMIUM, DISSOLVED	mg/L	6010	< 0.0030	0.0030		1	16-0CT-95	27913	L5379-21
COBALT, DISSOLVED	mg/L	6010	0.0076	0.0060	В	1	16-0CT-95	27913	L5379-21
COPPER, DISSOLVED	mg/L	6010	< 0.0030	0.0030		1	16-OCT-95	27913	L5379-21
IRON, DISSOLVED	mg/L	6010	< 0.012	0.012		1	16-0CT-95	27913	L5379-21
LEAD, DISSOLVED	mg/L	6010	< 0.056	0.056		1	16-0CT-95	27913	L5379-21
MAGNESIUM, DISSOLVED	mg/L	6010	18.	0.050		1	16-0CT-95	27913	L5379-21
MANGANESE, DISSOLVED	mg/L	6010	< 0.0020	0.0020		1	16-0CT-95	27913	L5379-21
NICKEL, DISSOLVED	mg/L	6010	< 0.015	0.015		1	16-0CT-95	27913	L5379-21
POTASSIUM, DISSOLVED	mg/L	6010	7.9	0.60		1	16-0CT-95	27913	L5379-21
SELENIUM, DISSOLVED	mg/L	6010	< 0.087	0.087		1	16-0CT-95	27913	L5379-21
SILVER, DISSOLVED	mg/L	6010	< 0.0040	0.0040		1	16-0CT-95	27913	L5379-21
SODIUM, DISSOLVED	mg/L	6010	150	0.070		1	16-0CT-95	27913	L5379-21
THALLIUM, DISSOLVED	mg/L	6010	0.089	0.050	В	1	16-0CT-95	27913	L5379-21
VANADIUM, DISSOLVED	mg/L	6010	0.0085	0.0040	В	1	16-0CT-95	27913	L5379-21
ZINC, DISSOLVED	mg/L	6010	0.011	0.0040	В	1	16-0CT-95	27913	L5379-21

TOTAL PETROLEUM HYDROCARBONS BY FTIR 418.1 TPH

Client Sample ID:

BOGJY4

Date Collected:

14-SEP-95 26-SEP-95

Date Analyzed: Matrix:

Water

QC Group:

418.1 TPH\_27753

LAL Sample ID:

L5379-8

Date Received:

16-SEP-95

Date Extracted: 25-SEP-95

Analytical Batch ID: 092695-418.1

Dilution Factor: 1

PRACTICAL DATA

CONSTITUENT RESULT QUANTIFATION LIMIT QUALIFIER(s)

mg/L mg/L

TRPH

<1.00

#### TOTAL PETROLEUM HYDROCARBONS BY FTIR 418.1 TPH

Client Sample ID: Date Collected: Date Analyzed:

BOGFV2 12-SEP-95 26-SEP-95

Matrix:

Water

QC Group:

418.1 TPH\_27753

LAL Sample ID: Date Received: 14-SEP-95

L5351-4 Date Extracted: 25-SEP-95

Analytical Batch ID: 092695-418.1

Dilution Factor: 1

PRACTICAL DATA CONSTITUENT RESULT QUANTITATION LIMIT QUALIFIER( $\#$ ) mg/L mg/L
--

TRPH

<1.00

TOTAL PETROLEUM HYDROCARBONS BY FTIR 418.1 TPH

> Client Sample ID: BOGFV2 Date Collected: Date Analyzed:

12-SEP-95

Matrix:

QC Group:

26-SEP-95 Water

418.1 TPH 27753

LAL Sample ID: 27753MS Date Received: 14-SEP-95 Date Extracted: 25-SEP-95

Analytical Batch ID: 092695-418.1

Dilution Factor: 1

PRACTICAL DATA
RESULT QUANTITATION LIMIT QUALIFIER(#) CONSTITUENT mg/L mg/L

TRPH

4.61

TOTAL PETROLEUM HYDROCARBONS BY FTIR

418.1 TPH

Client Sample ID: BOGFV2
Date Collected: 12-SEP-95
Date Analyzed: 26-SEP-95
Matrix: Water

Matrix:

QC Group:

Water 418.1 TPH\_27753 LAL Sample ID: 27753MSD Date Received: 14-SEP-95

Date Extracted: 25-SEP-95

Analytical Batch ID: 092695-418.1

Dilution Factor: 1

PRACTICAL DATA CONSTITUENT RESULT QUANTITATION LIMIT QUALIFIER(s) mg/L mg/L

TRPH

4.55

OIL AND GREASE - GRAVIMETRIC METHOD 413.1 OIL AND GREASE

Client Sample ID:

BOGJY4

Date Collected: Date Analyzed:

14-SEP-95 28-SEP-95

Matrix: QC Group:

Water

413.1 OIL AND GREASE 27944

LAL Sample ID: L5379-4

Date Received: 16-SEP-95 Date Extracted: 28-SEP-95

Analytical Batch ID: 092895-413.1

Dilution Factor: 1

PRACTICAL DATA
QUANTITATION LIMIT QUALIFIER(#)
mg/L CONSTITUENT RESULT

Total Oil and Grease

<5.00

OIL AND GREASE - GRAVIMETRIC METHOD 413.1 OIL AND GREASE

> Client Sample ID: BOGJY4 Date Collected: 14-SEP-95
> Date Analyzed: 28-SEP-95 Date Analyzed:

Water

Matrix: QC Group:

413.1 OIL AND GREASE 27944

LAL Sample ID: 27944MS
Date Received: 16-SEP-95
Date Extracted: 28-SEP-95

Analytical Batch ID: 092895-413.1

Dilution Factor: 1

PRACTICAL DATA CONSTITUENT RESULT QUANTITATION LIMIT QUALIFIER(s) mg/L

Total Oil and Grease

191

OIL AND GREASE - GRAVIMETRIC METHOD 413.1 OIL AND GREASE

> Client Sample ID: Date Collected:

Date Analyzed:

BOGJY4 14-SEP-95 28-SEP-95

Matrix: QC Group: Water

413.1 OIL AND GREASE 27944

LAL Sample ID:

27944MSD

Date Received: 16-SEP-95
Date Extracted: 28-SEP-95

Analytical Batch ID: 092895-413.1

Dilution Factor: 1

PRACTICAL DATA QUANTITATION LIMIT QUALIFIER(s) mg/L

Total Oil and Grease

184

#### RAD DATA REPORT (ra01)

#### Bechtel Hanford, Inc. \* Richland, WA

#### Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BOGJY4

LAL Sample ID: L5379-12

Date Collected: 14-SEP-95

Date Received: 16-SEP-95

Matrix:

Water

Login Number: L5379

Ac-228(Ra-228)	16-0CT-95	GAMMA SPEC LAL-0063 27809	5.	22.	40.		pCi/
Co-58	16-OCT-95	GAMMA SPEC LAL-0063 27809	2.5	5.7	9.6	-	pCi/
Co-60	16-0CT-95	GAMMA SPEC LAL-0063 27809	-0.5	1.5	12.		pCi/
Cs-137	16-0CT-95	GAMMA SPEC LAL-0063 27809	4.1	7.3	9.4		pCi/
Eu-152	16-0CT-95	GAMMA SPEC LAL-0063 27809	-4.0	8.1	36.		pCi/
Eu-154	16-0CT-95	GAMMA SPEC LAL-0063 27809	-6.7	4.2	34.		pCi/
Eu-155	16-0CT-95	GAMMA SPEC LAL-0063 27809	6.	13.	18.		pCi/
Fe-59	16-0CT-95	GAMMA SPEC LAL-0063 27809	-1.3	9.0	27	,	pCi/
Pb-212	16-0CT-95	GAMMA SPEC LAL-0063 27809	4.7	9.4	13.	-	pCi/
Pb-214(Ra-226)	16-0CT-95	GAMMA SPEC LAL-0063 27809	-3.5	8.4	17.		pCi/
Ra-226(GAMMA)	16-0CT-95	GAMMA SPEC LAL-0063 27809	-110	100	160		pCi/
Ru-106	16-0CT-95	GAMMA SPEC LAL-0063 27809	-20.	39.	74.		pCi/
J-235(GAMMA)	16-0CT-95	GAMMA SPEC LAL-0063 27809	-5.	26.	41.		pCi/
Gross Alpha	11-OCT-95	GR ALP/BETA LAL-0060 27812	1.8	3.2	5.8	C	pCi/
Gross Beta	11-OCT-95	GR ALP/BETA LAL-0060 27812	7.9	3.4	5.1	č	- pCi/i
Total radio-strontium	20-SEP-95	SR-90 LAL-0196 27451	0.67	0.61	1.0		pCi/l

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BOGJY4

LAL Sample ID: L5379-20

Date Collected: 14-SEP-95

Date Received: 16-SEP-95

Matrix:

Water

Login Number: L5379

Constituent	Analyzed	Batch : Light, Long by Line :	Activity	Enror	MDA <sub>88</sub> DataQuat	Units
н-3	02-OCT-95	TRITIUM(H3) LAL-0066_27851	1360	360	320	pCi/L

## ISOTOPES DILUTION RECORD

Secondary/Working Level Dilution
Date: 4/8/93 Preparer's Name: A. Wong
Pipet Check / Balance Wt. Check Done ( )
Diluent used: O · [ M HC]
I. Isotope #1: <u>C5 - 13</u> 7
Diluted Source ID (log#): $91-225-24-3$
A: Source activity: 940.831pCi/ml decay corrected from
B: Amount of source transferred: 0.2 ml
C: Total amount of dilution: 100 ml
D: Isotope activity (A*B/C): 1.8817pa/ml
II. Isotope #2: <u>Co -6</u> 0
Diluted Source ID (log#): 9(-225-80-1
E: Source activity: 998.1087 p Ci/ml de cay conected from 1091.1pCi/
F: Amount of source transferred: 0.2 ml
G: Total amount of dilution:looml_
H: Isotope activity (E*F/G): 1.9962 p Ci/ml
Dilution Log Book ID: 92-353-78
Reviewed by: A Date: 4/9/93

### ISOTOPES DILUTION RECORD

Secondary/Working Level Dilution
Date: 4/9/93 Preparer's Name: A. Wory
Pipet Check / Balance Wt. Check Done (v)
Diluent used: <u>0-1 M HC</u>
I. Isotope #1: <u>Cs - 13</u> 7
Diluted Source ID (log#): 91-225-24-3
A: Source activity: 940 831 pCi/ml decay corrected from 975.1348
B: Amount of source transferred: 2 ml
C: Total amount of dilution: (o ml
D: Isotope activity (A*B/C): 188-1662 p Ci /ml
II. Isotope #2: <u>60-60</u>
Diluted Source ID (log#): 91-225-80-
E: Source activity: 998.1087pG/ml
F: Amount of source transferred: 2 ml
G: Total amount of dilution:
H: Isotope activity (E*F/G): 199.6217 pci/ml
★ Dilution Log Book ID: 92-353-79
Reviewed by: Date: 4/9/93

# CERTIFICATE OF CALIBRATION GAMMA STANDARD SOLUTION

Radionuclide

Cs-137

Customer: LOCKHEED ENGINEERING & SCIENCES Co.

Half Life:

 $30.0 \pm 0.2$  years

P.O.No.:

06LAB1036

Catalog No.: Source No.:

7137 389-21-2 Reference Date: Contained Radioscrivity:

September 1 1991 1.002

12:00 PST. μCi.

Description of Solution

a. Mass of solution:

4.9523

b. Chemical form:

CsCl in 0.1N HCl None added

grams.

c. Carrier content:

0.9996

gram/ml @ 20°C.

Radioimpurities

d. Density:

None detected

Radioactive Daughters

None

Radiomaclide Concentration

0.202

μCi/gram.

Method of Calibration

Weighed aliquots of the solution were assayed using gamma spectrometry:

Energy peak(s) integrated under:

662

KaV.

Branching ratio(s) used:

0.8521

gamme rays per decay.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:

<u>+</u> 1.0%

b. Random uncertainty in assay:

±1.1%

c. Random uncertainty in weighing(s):

+0.4%

d. Total uncertainty at the 99% confidence level:

±2.5%

#### **NIST Tracoability**

This calibration is implicitly traceable to the National Institute of Standards and Technology.

#### Notes

- 1. Nuclear data were taken from "Table of Isotopea", Seventh Edition, edited by Virginia S. Shirley.
- 2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)



**OUALITY CONTRO** 

ISOTOPE PRODUCTS LABORATORIES 1800 No. Keystone Street.,

Burbank, Culifornia 91504

(818) 843 - 7000

156

MAN OF WWWW. 4. 9149

U.S. Environmental Protection Agency imposed 1/4/90 Environmental Monitoring Systems Laboratory-Las Vegas

Nuclear Radiation Assessment Division ID # 91-0215-P=

## Calibration Certificate

Total mass of this solution  APPROX. 5.0 _ evens  Method of measurement  The activity of the primary solution was measured using an ionization chamber.  The activity of the dilution was measured using gamma spectroscopy.  The redenucide has decayed through
Approx. 5.0 _ state  Method of measurement  The activity of the primary solution was measured using an ionization chamber.  The activity of the dilution was measured using gamma
Approx. 5.0 _ grame  Method of measurement  The activity of the primary solution was measured usi an ionization chamber.  The activity of the dilution was measured using gamma
Approx. 5.0 _ grame  Method of measurement  The activity of the primary solution was measured using including an ionization chamber.
Total mass of this solution  APPROX. 5.0 _ erame  Method of measurement  The activity of the primary solution was measured usi
APPROX. 5.0 _ grame  Method of measurement
Total mass of this solution
Total mass of this solution
of the designer nuclear 1
The principal activity was accompanied at the quoted time by
Activity of daughter radionuclide
22.2   nano curios of Cobalt-60
Activity per gram of this solution
activity of principal redionuclide
2506-2
TIO TIATIO CONT.
Nominal activity 110 page civitat

	Preservative:		
Chemical Composition of Solution	Carrier content per gram of solution: 30 micrograms cobalt		components: 1 M HC1
	Cobalt-60 decays 100 per by prompt gamma transiti		emission followed
Decay Schemes	This standardization is based on the foll daughter nuclides and impurities (no all assumption of quoted half-life have been	owance for error in th	ese assumptions or the
	the overall uncertainty (often called accumulate the quoted result from the true value. It confidence limits and the worst case est. The overall uncertainty is therefore calcumulated and is +3.5 %3.5 % of the	is a combination of rimate of the systemat	endom error $[t(sm)]$ at the 99.7' so errors $(+\delta, -\delta')$ $+ [t(sm) + \delta]$ , $- [t(sm) + \delta']$
	The maximum uncertainty due to the assignment uncertainty of the standard) is obtained and negative systematic error ( +2 , 1 % or -2 , 1 %	tained by the separati	arithmetic summation of the
	(The 99.7% confidence limits are given b for the degree of freedom (n-1)).	y i(sm) where t is obti	lined from the student t factor
	Che 99.7% and identifying the second		
	The precision of this standard was such	that the certified value	a of the radioactive
Random Errors			
	The activity of impurity (1) is not (2) is not ( included in the quoted figures of the principle.	3) is not pai activity	
	(3)	less than equal to	of the principal activit
	(2)	less than i equal to	% of the principal activit
	(I) o smahad	less than equal to	of the principal activit
	The manufacturer states that activities othe and of its daughter nuclides if any were es	timated, known to be	

Date Certificate Prepared May 31, 1991

Approval Signature May 31, 1991

Approval Signature

# RADIATION RESULTS CHECK REPORT

Workgroup Number: GR ALP/BETA LAL-0060\_27812

Sample	Parameter	Valu <del>e</del>	Error	MDA
278120UP1	Gross Alpha	0.0146056	2.97087	6.16435
27812LCS1	Gross Alpha	41.0937	4.77935	1.57387
27812H8B1	Gross Alpha	0.700113	0.695432	1.08298
27812HS1	Gross Alpha	82.0275	13.0683	5.8528
L5379-12	Gross Alpha	1.7533	3,20938	5.75075
L5440-12	Gross Alpha	2.05197	1.57114	2.20882
278120UP1	Gross Beta	10.352	3.48101	4.97015
27812LCS1	Gross Beta	41.9867	3.64313	2.12547
2781214881	Gross Beta	0.570641	1.19384	2.03893
27812HS1	Gross Beta	103.728	8.84446	5.14088
L5379-12	Gross Beta	7.94663	3.42358	5.1305
L5440-12	Gross Beta	6.47903	1.65388	2.18383

can be performed without a density conversion. If the diluent changes, a weighted proportion density conversion is necessary.

Signed

Read and Understood By

Signed

169

Date

> 1 d. Lilling of 1- and & 10 the 41- 0225-60-1 ANDOD,

# CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclida

Am-241

Customer: LOCKHEED ENGINEERING & SCIENCES Co.

Half Life:

 $432.7 \pm 0.5 \text{ years}$ 

06LAB1245

Catalog No.:

7241

Reference Date:

P.O.No.:

November 1 1991

Source No.:

388-100-1

Contained Radioactivity:

0.997

Description of Solution

a. Mass of solution:

5.0007

erane.

μCi.

12:00 PST.

b. Chemical form:

AmCl3 in 0.5N HCl

c. Carrier content:

None added

d. Density:

1.0077

gram/mi @ 20°C.

Radioimpurities

None detected

Radioactive Daughtors

None detected

Radioanchide Concentration

0.1994

pCi/gram.

#### Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

#### Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration: ±2.0%
b. Random uncertainty in assay: ±0.7%
c. Random uncertainty in weighing(s): ±0.0%
d. Total uncertainty at the 99% confidence level: ±2.7%

#### **NIST Tracoability**

This calibration is implicitly traceable to the National Institute of Standards and Technology.

#### Notes

- 1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
- IPL participates in an NIST measurement assurance program to establish and maintain implicit tracesbility for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)



Son & Silver QUALITY CONTROL

ISOTOPE PRODUCTS LABORATORIES

1800 No. Keystone Street., Burbank, California 91504

(818) 843 - 7000

17C

THIS IS A PHOTOCOPY OF THE CERTIFICATE WHICH IS BEING MAILED TO YOU UNDER SEPARATE COVER.

# National Institute of Standards & Technology

# Certificate

# Standard Reference Material 4919-G Radioactivity Standard

Radionuclide

Strontium-90

Source identification

4919-G

Source description

Solution in NIST borosilicate-glass ampoule (1)\*

Solution composition

Strontium-90 plus yttrium-90 plus approximately 95  $\mu$ g each of non-radioactive strontium and yttrium per gram of 1-molar hydrochloric acid (2)

Mass

Approximately 5.0 grams

Radioactivity concentration

4.514 x 103 Bq g1

Reference time

1200 EST August 1, 1990

Overall uncertainty

1.05 percent (9)

Photon-emitting impurities

None observed (1)

Alpha-particle-emitting impurities

None observed (5)

Half life

28.5 ± 0.2 years (9)

Measuring instrument

4#B liquid-scintillation counter

This standard reference material was prepared in the Center for Radiation Research, Ionizing Radiation Division, Radioactivity Group, Dale D. Hoppes, Group Leader.

Gaithersburg, MD 20899 Tuary, 1991

William P. Reed, Acting Chief
Office of Standard Reference Materials

\*Notes on back

> 1 d. William To 100 ml & make 91- 0225-60-1 ANDOSE

# CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionaclida

Am-241

Customer: LOCKHEED ENGINEERING & SCIENCES C

Half Life:

432.7 ± 0.5 years

P.O.No.:

06LAB1245

Catalog No.:

7241

Reference Date:

November 1 1991

Source No.:

388-100-1

Contained Radioactivity:

0.997

μCi.

12:00 PET.

Description of Sobstion

a. Mass of solution: b. Chemical form: 5.0007

AmCl3 in 0.5N HCl

c. Carrier content:

None added

1.0077

gram/mi ⊕ 20°C.

Redicimpurities

d. Density:

None detected

Redicactive Daughters

None detected

Redicenchide Concentration

0.1994

pCV gran.

Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Monoument

a. Systematic uncertainty in instrument calibration:

±2.0%

b. Random uncertainty in accey:

±0.7%

c. Random uncertainty in weighing(s):

±0.0%

d. Total uncertainty at the 99% confidence level:

±2.7%

## **NIST Traceshilly**

This calibration is implicitly traceable to the National Institute of Standards and Technology.

#### Notes

- 1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia 5. Shirley.
- 2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceshility for a number of suclides, based on the blind assay(and later NIST certification) of Standard Refluence Materials. (As in NRC Regulatory Guide 4.15)



CUALITY CONTROL

MOTOPE PRODUCTS LABORATORIES

1800 No. Keystone Street., Barbank, California 91504

(\$15) \$43 - 7000

175

# U.S. Environmental Protection Agency Environmental Monitoring Systems Laboratory-Las Vegas Nuclear Radiation Assessment Division

#### Calibration Certificate

Description	Frincipal redionuclide Strontium-90 Hell-life 28.6 years
	Nominal activity 27 nano curius
	Nominal volume 5 ml in ampeule/bottle number 94003-1
Measurement	Activity of principal radionuclida
	Activity per gram of this solution
	5.40 nano curies of Strontium-90
	at 0400 hours PST on April 1, 1994
	Activity of daughter radionuclide
	The principal activity was accompanied at the quoted time by
	5.40 nanocuries for gram
	of the daughter nuclide Yttrium-90
	Total mass of this solution
	Approximately 5.0 *****
	Method of measurement
	The activity of the primary solution was measured

The activity of the primary solution was measured by liquid scintillation counting.

The activity of the dilution was measured by liquid scintillation counting.

Useful Life	This radionuclide has decayed through	0.0	half lives since it was absorbed by EMSL-LV
	We recommend that this solution should	net be used aft	August 1994

This dilution was prepared for the 1994 ASTM Collaborative Study of a test method for the determination of Sr-90 in water.

	Preservative:		
Chemical Composition of Solution	Carrier content per gram of solution: 30 micrograms strontium		oomponents:  M HCl
<			eta emission to 100 percent by
Decay Schemes	This standardization is based on the following daughter nuclides and impurities (no allowing assumption of quoted half-life have been in	unce for error in the	sse assumptions or the
	the overall uncertainty (often called accurace the quoted result from the true value. It is confidence limits and the worst case estimate overall uncertainty is therefore calculate and is $+4.0\%$ , $-4.0\%$ of the quotest calculate and is $+4.0\%$ .	a combination of ra ite of the systemat	indom error [t(sm)] at the 99.1 ic errors ( + & , - & ' ) • [t(sm) + &] , - [t(sm) + &]
	The maximum uncertainty due to the assess known uncertainty of the standard) is obtain positive and negative systematic error ( $+\delta$ +3.8 % or $-3.8$ %	ned by the separate	arithmetic summation of the
	(The 99.7% confidence limits are given by to for the degree of freedom (n-1)).		
	The precision of this standard was such tha		
Random Errors			
	The activity of impurity (1) is not (2) is not (3) is included in the quoted figures of the principal	s not	
	(3)	less than equal to	% of the principal activ
	(2)	less than	% of the principal activ
	(1)	less than equal to	% of the principal activ

Date Certificate Prepared

**Approval Signature** 

Parl B. Hahn 17

# INITIAL STANDARD DILUTION RECORD

	Standard In	formation:				
Isotope:	Sr-90	Vendor:		EPA		_
Activity of Standard Received:	2.7×104 uCi	Vendor I.D. #		14003-1		
Weight of Standard Received (g):	500	LAL I.D. #:	<del></del>	A C528	<u>}                                    </u>	
Standard Activity (pCi/g):	5.4 x 103 pCi/g	NIST Traceable ?	<u>_</u>	Jes		_
Halflife in Years or Days:	28.6 yrs	Certificate #:		94003	-1	
Reference Date:	4-1-1994	Receiver's Name:		k. Free	<u>,                                      </u>	_
		Date Received:		5-3-9	<del>]</del>	-
	Primary	Dilution				
Balance Verification?:		405				
Diluent Used:		0.   M  }(	기		····	_
a: Decay Corrected Standard Act	tivity (pCi/g):	5.4 x 103	pCi/g			
b: Weight of the Source Transfer	rred (g):	4.9670	0			
c: Total diluted weight (g):		49.91	9			_
d: Total Diluted Volume (mL)		50	mL			_
e: Activity of Dilution by Weight	t (pCi/g) [a * b / c ]:	531.4	pCi/g			_
f: Calculated Density of Solution	(g/ml) [c / d]:	0.9982	g/mL			
g: Activity of Dilution by Volume	(pCi/mL) [e * f]:	536.44	pCi/mL	92.174	82 - 1	
h. Dilution Logbook I.D. #:		93-474	81-	Ci	4/7/95	
Prepared By	1: Ifgnes Won	Preparation Date	: <u>6-1</u>	5-94	· <del>-</del>	
	1: Ope Hatchiren	Review Date	: 6/3	30/94	_	
Purity/Cross Check Performed B	y:	_ Check Date	):		<b>-</b>	Ì
" Mhrs stylat.				*****	17	18
Signed	Date	Signed			Date	

#### RADIATION RESULTS CHECK REPORT

Workgroup Number: SR-90 LAL-0196\_27451

¢ample:	Perameter	Vatue	Error	· MDA
274510UP1	Total radio-strontium	7.27899	1.03161	1.13619
27451LCS1	Total radio-strontium	45.2713	2.827	0.94523
27451M881	Total radio-strontium	-0.334626	0.523796	0.953686
L5351-6	Total radio-strontium	7.41765	1.03967	1.12736
L5379-12	Total radio-strontium	0.665634	0.61304	1.01197

#### Strontium Carrier Standardization

Strontium Carrier (10 mg/mL):

Use commercially available 10,000  $\mu$ g Sr/mL ICP Standard or equivalent. Alternately, Dissolve 24.16 g of Sr(NO<sub>3</sub>)<sub>2</sub> in water and dilute to 1 L in a volumetric flask with water.

Perform calibration check on a 0.5 mL pipet and then carefully pipet 3 - 0.5 mL portions of the strontium carrier solution into separate cleaned dried and tared planchets. Dry the planchet under a drying lamp. Cool the planchets in a desiccator and weigh. Sr Canin # 91-208 - 100-) Was recalibrated.

give a new calibrated value. Prepped m 1-5-95

U	Calib # 1	Calib # 2	Calib # 3
Carrier plus planchet wt.	6.60823	6.65050	6-818936
Tare wt. of planchet	6.59582	6.63805	6.80688
Net wt. of carrier added (mg)	0.01241	0.01245	0.012068

AVERAGE Sr(NO<sub>3</sub>)<sub>2</sub> ± STD DEV. = 0.01231 ov

Expected mg of  $Sr(NO_3)_2 = cert.value(\approx 10 mgofSr/mL) * 0.5 mL * 2.41$ 

Within 3% of expected (12.08 mg/0.5 mL) value (yes/no) \_\_\_\_\_\_

Initial and Date: 10 - 95

Date

Read and Understood By

Solar Denger

Date 187

100 Sr Cavier	Standardization	Notebook No		
			July July July July July July July July	
Strontium Carrier (		er Standardization	3, 4	
Use commercially a Dissolve 24.16 g o water.	vailable 10,000 µg Sr/i of <b>Sr(NO<sub>3</sub>)<sub>2</sub> in water a</b>	mLICP Standard or eq nd dilute to 1 L in a	uivalent. Alternately, volumetric flask with	
portions of the st	check on a 0.5 mL prontium carrier solution planchet under a dryin	on into separate clea	aned dried and tared	
	Calib # 1	Calib # 2	Calib # 3	
Carrier plus planchet wt.	6.58185g	6.49626g	6.56816g	
Tare wt. of planchet	6.56968 g	6.48464 q	6.55620 9	
Net wt. of carrier added (mg)	0.012179	0.01162	0.01196 g	
	$\pm$ STD DEV. = $\bigcirc$ $Sr(NO_3)_2 = cert.ve$	V		
Within 3% of expected (12.08 mg/0.5 mL) value (yes/no)				
Initial and Date: (20) 3-6-94				
			Continued on Page	
Janes Wony Signed	3-15-94 Date	ead and Understood By QA Me Med Zie Signed	Review: 188 e. 8/14/94 bate	

KL va 5/3177 AC5881

#### U.S. Environmental Protection Agency Environmental Monitoring Systems Laboratory-Las Vegas Nuclear Radiation Assessment Division

#### Calibration Certificate

Description	Principal redemudide Strontium-90 Hall-life 28.6 years
	Nominal activity 27 nano curies
	Nominal volume 5 ml in ampoule/bottle number 94003-1
Measurement	Activity of principal radionuclide
	Activity per gram of this solution
	5.40 nano curies of Strontium-90
	at 0400 hours PST on April 1, 1994
	Activity of daughter radionuclide
	The principal activity was accompanied at the queted time by
	5.40 nanocures for gram
	of the daughter muclide Yttrium-90
	Total mass of this solution
	Approximately 5.0 grams
•	Method of measurement
	The activity of the primary solution was measured

by liquid scintillation counting.

The activity of the dilution was measured by liquid scintillation counting.

Useful Life	This redienuclide has decayed shrough	0.0	half lives since it was absenced by EMSL-LV
	We recommend that this solution should not	be used of	August 1994

This dilution was prepared for the 1994 ASTM Collaborative Study of a test method for the determination of Sr-90 in water.

Strontium-90 decays 100 p		ent of accuracy above).		
assumption of quoted half-life have been if	actuded in the stateme			
daughter nuclides and impurities (no allow	ance for error in these			
confidence limits and the worst case estimate the overall uncertainty is therefore calculate.	ate of the systematic e ted on the basis of + [	rrors ( + ð ð ´ ) t(sm) + ð] [t(sm) +ð ´]		
	• •	· <u> </u>		
+3.8 % or -3.8 %		•		
known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ( $+\delta$ $-\delta$ $'$ ). These have been estimated not to exceed				
The maximum uncertainty due to the assessable systematic errors (dilution, counting, and				
(The 99.7% confidence limits are given by to for the degree of freedom (n-1)).	(sm) where t is obtaine	id from the student t factor		
concentration of the principal activity had a	standard error (sm) no	ot greater than ± 0.1 %		
The precision of this standard was such tha	it the certified value of	the radioactive		
	•			
(3)	less than equal to	% of the principal activity		
(2)	less than equal to	% of the principal activity		
(1)	equal to	% of the principal activity		
	The activity of impurity (1) is not (2) is not (3) is included in the quoted figures of the principal.  The precision of this standard was such that concentration of the principal activity had a (The 99.7% confidence limits are given by the for the degree of freedom (n-1)).  The maximum uncertainty due to the assess known uncertainty of the standard) is obtain positive and negative systematic error ( + & +3.8 % or -3.8 %  the overall uncertainty (often called accurate quoted result from the true value. It is confidence limits and the worst case estimate the overall uncertainty is therefore calculated and is +4.0 %4.0 % of the quoted result in the standardization is based on the follows:	[2] less than equal to less tha		

**Date Certificate Prepared** 

Approval Signature

Parl B. Hahr

# INITIAL STANDARD DILUTION RECORD

Standard In	formation:
Isotope: Sr-90	Vendor: EPA
Activity of Standard Received: 2.7×10 <sup>4</sup> uCi	Vendor I.D. # 94003-1
Weight of Standard Received (g): 5 0 g	LAL I.D. #: A C 5 2 8 \
Standard Activity (pCi/g): 5.4 x 10 <sup>3</sup> pCi/g	NIST Traceable ?
Halflife in Years or Days: 28 6 yrs	Certificate #: 94003 - 1
Reference Date: 4-1-1994	Receiver's Name: K. Tyll
	Date Received: 5-3-94
Primary	Dilution
Balance Verification?:	405
Diluent Used:	0. IM HCI
a: Decay Corrected Standard Activity (pCi/g):	5.4 X 10 3 pCi/g
b: Weight of the Source Transferred (g):	4.9670
c: Total diluted weight (g):	49.91
d: Total Diluted Volume (mL)	50 mL
e: Activity of Dilution by Weight (pCi/g) [a * b / c]:	537.4 pci/g
f: Calculated Density of Solution (g/ml) [c / d]:	0.9982 g/mL
g: Activity of Dilution by Valume (pCi/mL) [e * f]:	536.44 pCi/mL
h. Dilution Logbook I.D. #:	-93-474-81-1-014/195
Prepared By: James Won	Preparation Date: 6-15-94
Reviewed By: Ose Hetchism	Review Date: 6/30/94
Purity/Cross Check Performed By:	Check Date:
- Mug statet,	
Signed Date	Signed Date

Notebook No
Continued From Page

# SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

	Dil	ution Sourc	e Information			
Isotope: Ref , 4-1-94 Parent Barcode Number	r		<u>Sr-90</u> AC528		·	
Vendor or Certificate I	.D. # of Parent Sta	ındard:	EPA 9	4003 -		
Diluted Source Logboo	k I.D. #:		93-474	-82-1	<u></u>	
Balance Verification?:			ye	<u>s</u>		
Diluent Used:			0.141	101		
		Dilut	ion			
*Diluent:		(	)./ M Hel			•
*Density of diluent (g/n	<b>ာ</b>  ):		N/A.			ļ
a: Parent Specific Acti	vit <b>y</b> :		536.44 pC	/mb	<del></del>	
b: Amount of Source	Transferred:	5.00	18 9		<del></del>	
c: Total amount of Dil	ution:	100 ·	20 g		<del></del>	
d: Total Volume of Dilu	tion:		N/A			
e: Activity of Dilution	[a * b / c]:		<u> </u>			
f: Activity of Dilution	(a * b / d):		26.78 pG/m		<del></del>	
Dilution Logbook I.D. 4	<b>!:</b>	94.	-677-44-			
Prepared By:	nes Wong	,	Preparation Date:	3-2-9	5	
Reviewed By:	Hite		Review Date:	3/3/	95	
If the diluent remains unchains can be performed without a				<b>`</b>	/	- 1
		····	, XX	10 Den	( 3A5	1
Signed	Date		Signed	1	4	ate

#### RADIATION RESULTS CHECK REPORT

Workgroup Number: TRITIUM(H3) LAL-0066\_27851

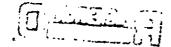
Sample	Parameter	Value	Error	MDA
27851DUP1	H-3	909.653	321.456	313.281
27851LCS1	H-3	2113.43	410.145	311.155
27851M8B1	H-3	55.5773	237.925	303.134
27851MS1	H-3	4501.39	563.207	319.627
L5379-20	н-3	1359.07	359.374	317.161



## U.S. Environmental Protection Agency Environmental Monitoring Systems Laboratory-Las Vegas Nuclear Radiation Assessment Division

## Calibration Certificate

<u> </u>	
Description	Principal redionuclide Tritium (H-3) HeH-Infe 12.43 years
	Nominal activity 110 nano curies
	Nominal volume 5 ml in ampoule/bottle number 2606-1
Measurement	Activity of principal radionuclide
	Activity per gram of this solution
	21.9 nano curies of Tritium
	at 0400 hours PST on June 3, 1992
	Activity of daughter radionuclide
	The principal activity was accompanied at the quoted time by
	curies Per gram
	of the daughter nuclide
	Total mass of this solution
	APPROX. 5.0
	Method of measurement *-
	The activity of the primary solution and this dilution were measured by liquid scintillation counting.
	Counting efficiencies for both standardizations were determined by counting solutions directly traceable to the National Institute of Standards & Technology (NIST).
Useful Life	
oscipi Mit	This redienuclide has decayed through D.O half fives since it was obtained by EMSL-LV
	We recommend that this salution should not be used after December 1999



	The manufacturer states that activities other and of its daughter nuclides, if any, were est		apai nuclide	
	(1) none	less than equal to	% of the	principal activity
	(2)	less than equal to	% of the	principal activity
	(3)	less than equal to	% of the	principal activity
	The activity of impurity (1) is not (2) is not (3 included in the quoted figures of the princip			
Random Errors				
	The precision of this standard was such the			
	concentration of the principal activity had (The 99.7% confidence limits are given by for the degree of freedom (n-1)).		_	المستشيقيا
	The maximum uncertainty due to the asseknown uncertainty of the standard) is obtationally positive and negative systematic error (++2.9% or -2.9%	ined by the separate	arithmetic sum	mation of the
	the overall uncertainty (often called accurate quoted result from the true value. It is confidence limits and the worst case esting The overall uncertainty is therefore calculand is $+4.3\%$ . $-4.3\%$ of the	s a combination of rai	ndom error [t(si : errors ( + & , - [t(sm) + &] , -	m)] at the 99.7% & ' }
Decay Schemes	This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).			
<u>.</u>	Tritium decays 100 perce maximum energy is 18.6 K			The 68 Kev.
	Carrier content per gram of solution:	Other c	omponents:	
	100 percent H <sub>2</sub> O	Bari	ım less ti	han 0.004 per
Composition	100 percent n <sub>2</sub> 0	Lead	ress that	n 3x10 <sup>-5</sup> perc
Chemical Composition of Solution	Preservative:	Lead	iess tha	n 3x10 , bero

Date Certificate Prepared

Approval Signature

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### U.S. DEPARTMENT OF COMMERCE National Institute of Standards & Technology Gaithersburg, MD 20899

## REPORT OF TRACEABILITY

U.S. Environmental Protection Agency Environmental Monitoring Systems Laboratory Las Vegas, Nevada

Radionuclide Hydrogen-3

Source identification 2606-1, prepared by EMSL

Source description Liquid in 5-mL flame-sealed glass ampoule

Source mass . Approximately 5.0 grams

Source composition Hydrogen-3 in water

Reference time 0700 EST June 3, 1992

**NIST DATA** EMSL DATA Radioactivity concentration 810.5 Bq g<sup>-1</sup> 810.3 Bq g<sup>-1</sup> Expanded uncertainty 0.64 percent (1.2)\* 4.3 percent (3) Photon-emitting impurities None observed (9) None observed Measuring instrument  $4\pi\beta$  liquid-scintillation counters Liquid-scintillation calibrated with SRM 4926D counting

Half life  $12.43 \pm 0.05$  years (5)

Difference from NIST -0.05 percent (9)



For the Director,

Gaithersburg, MD 20899 January 1994 J.M. Robin Hutchinson, Acting Group Leader Radioactivity Group

Physics Laboratory

mathetin

\*Notes on next page

#### **NOTES**

- The uncertainty analysis methodology and nomenclature used for the reported uncertainties are based on uniform NIST guidelines and are compatible with those adopted by the principal international metrology standardization bodies [cf., B.N. Taylor and C.E. Kuyatt, NIST Technical Note 1129 (1993)].
- The combined standard uncertainty,  $u_e = 0.32$  percent, is the quadratic combination of the standard deviation (or standard deviation of the mean where appropriate), or approximations thereof, for the following component uncertainties:

a)	11 liquid-scintillation measurements on each of	
•	4 vials	0.11 percent
b)	gravimetric	0.05 percent
c)	calibration of SRM 4926D	0.29 percent
ď)	background	0.00 percent
e)	half life	0.03 percent

The expanded uncertainty, U = 0.64 percent, is obtained by multiplying  $u_c$  by a coverage factor of k = 2 and is assumed to provide an uncertainty interval of at least 95% confidence.

- <sup>(3)</sup> Overall uncertainty reported by EMSL.
- (4) The limit of detection for photon-emitting impurities is:

0.08 y s<sup>-1</sup>g<sup>-1</sup> for energies between 90 and 2700 keV.

- Unterweger, M.P., Coursey, B.M., Schima, F.J., and Mann, W.B., Int. J. Appl. Radiat. Isot., 31, 611 (1980).
- This result demonstrates the traceability of EMSL to NIST, for this measurement, to within five percent as specified in the appendix, <u>Traceability Studies</u>, of the EPA-NIST interagency agreement of April 1976, as amended.

For further information call Larry Lucas at 301-975-5546 or Jeffrey Cessna at 301-975-5539.

Notebook No. 072	. ,
Continued From Page	NA

# INITIAL STANDARD DILUTION RECORD

	. Standard Int	ormation: 1 14 75 FS	g grow and the
Isotope:	H-3	Vendor:	EPA
Activity of Standard Received:	,   uCi -	Vendor 1.D. # 5/41/95	
Weight of Standard Received (g):	5 <b>g</b>	LAL I.D. #: 2/7/ <sup>35</sup>	AC 5299
Standard Activity (pCi/g):	21.9 pC//g	NIST Traceable ?	Yes
Halflife in Years or Days:	12.43 yrs	Certificate #:	26¢6-1
Reference Date:	0400, 6/3/92	Receiver's Name:	Kavin Free
		Date Received:	1/25/95
,	Primary (	Dilution	,
Balance Verification?:		Yes	-
Diluent Used:	EPA	Distilled ASTM Type II Wet	in (Desel Water)
a: Decay Corrected Standard Acti	vity (pCi/g):	21.9 n 6:/37 4-939-17/pCi/g	on 6/3/92
b: Weight of the Source Transferred (g):		4.939 0	
c: Total diluted weight (g):		49 · 377 9	
d: Total Diluted Volume (mL)		50 49,5 mL	
e: Activity of Dilution by Weight	(pCi/g) [a * b / c]:	2190 pCi/g	
f: Galculated Density of Solution (	g/ml) [c / d]:	0.99777 g/mL	
g: Activity of Dilution by Volume	(pCi/mL) [e * f]:	2190 pCi/m	nl on 6/3/92
h. Dilution Logbook I.D. #:	C. Penewy	LAL-95-072	
Prepared By:	Jeel tutchinism J. M.	rals Preparation Date: 2/	7/95
Reviewed By		Review Date:	47/95
Purity/Cross Check Performed By	;	Check Date:	
Signed	Date C	P5 8 95 Signed	Date

OJECT	Notebook No	
<del></del>	WORKING LEVE.,	
Dilution Sc	ource Information	
Isotope:	H-3tes Ms	-
Parent Barcode Number	H-3+CS MS AC 5299	
Vendor or Certificate I.D. # of Parent Standard:		-
Diluted Source Logbook I.D. #:	95-0721-1	-
Balance Verification?:	<u>Yes</u>	-
Diluent Used:	Deal Water	-
	Dilution	
+ Diluent:	Low Bly WATER	_
*Density of diluent (g/ml):	g/ml	.   -
a: Parent Specific Activity:	2/90 pCi/g	-
b: Amount of Source Transferred:	<b>  0,</b> ○ g	-
c: Total amount of Dilution:	/00 g	-
d: Total Volume of Dilution:	O O mi	-
e: Activity of Dilution [a * b / c]:	pCi/g	.   -
f: Activity of Dilution (a * b / d):	219 pci/ml on 6/3/52	
Dilution Logbook I.D. #:	94-0677-70	
Prepared By: Joe Hithau	Preparation Date: 6/23/95	
Reviewed By:	Preparation Date: 6/23/95  Review Date: 6/23/95	-
H	e dilution source, then a weight dilution of a volume unit source at changes, a weighted proportion density conversion is necessa rread and Understood By	11 7

205

Signed Date Signed Date



### U.S. Environmental Protection Agency Environmental Monitoring Systems Laboratory-Las Vegas Nuclear Radiation Assessment Division

#### Calibration Certificate

Description	Principal redionuclide Tritium (H-3) Half-life 12.43 years				
	Nominal activity 110 nano curses				
	Nominal volume 5 ml in ampoule/bottle number 2606-1				
Measurement	Activity of principal radionuclide				
	Activity per gram of this solution				
	21.9 nano cures of Tritium				
	at 0400 hours PST on June 3, 1992				
	Activity of daughter radionuclide				
	The principal activity was accompanied at the quoted time by				
	curies Per gram				
	of the daughter nuclide				
	Total mass of this solution				
	APPROX. 5.0 grams				
	Method of measurement				
	The activity of the primary solution and this dilution were measured by liquid scintillation counting.				
-	Counting efficiencies for both standardizations were determined by counting solutions directly traceable to the National Institute of Standards & Technology (NIST).				
Useful Life	This radienuclide has decayed through 0.0 half lives since it was obtained by EMSL-LV				
	We recommend that this solution should not be used after December 1999				



## U.S. DEPARTMENT OF COMMERCE National Institute of Standards & Technology Galthersburg, MD 20899

## REPORT OF TRACEABILITY

U.S. Environmental Protection Agency Environmental Monitoring Systems Laboratory Las Vegas, Nevada

Radionuclide

Hydrogen-3

Source identification

2606-1, prepared by EMSL

Source description

Liquid in 5-mL flame-sealed glass ampoule

Source mass .

Approximately 5.0 grams

Source composition

Hydrogen-3 in water

Reference time

0700 EST June 3, 1992

	NIST DATA	EMSL DATA
Radioactivity concentration	810.5 Bq g <sup>-1</sup>	810.3 Bq g <sup>-1</sup>
Expanded uncertainty	0.64 percent (1.2)*	4.3 percent (3)
Photon-emitting impurities	None observed (4)	None observed
Measuring instrument	$4\pi\beta$ liquid-scintillation counters calibrated with SRM 4926D	Liquid-scintillation counting
Half life	$12.43 \pm 0.05 \text{ years}^{(5)}$	
Difference from NIST		-0.05 percent (6)

For the Director,

Gaithersburg, MD 20899 January 1994 J.M. Robin Hutchinson, Acting Group Leader Radioactivity Group

Physics Laboratory

methototo

\*Notes on next page

Continued From Page \_

# INITIAL STANDARD DILUTION RECORD

·	Standard I	nformation:	. ,
sotope:	H-3	Vendor:	<u>EPA</u>
Activity of Standard Received:	lt uCi	Vendor I.D. # STH	h5
Weight of Standard Received (g):	5 g	LAL I.D. #:	<u>AC 5299</u>
Standard Activity (pCi/g): 2	1.9 pC//g	기가의 NIST Traceable ?	Yes
falflife in Years or Days: 12	43 yrs	Certificate #:	<u>26φ6-1</u>
Reference Date: <u>Ao</u>	0,6/3/92	Receiver's Name:	<u>Kevin Free</u> 1/25/95
		Date Received:	1/25/95
111111111111111111111111111111111111111	Primary	Dilution	•
Balance Verification?:	EPA	Distilled ASTU TYAT	Water (Dead Water)
Decay Corrected Standard Activity		21.9 10.	1 pci/g on 6/3/92
Weight of the Source Transferred (g	):	4.939	9
e: Total diluted weight (g):		49.377 49.1985	<u> </u>
: Total Diluted Volume (mL)		50 49,5	mL.
e: Activity of Dilution by Weight (pCi/	g) [a * b / c]:	2190	pCi/g
Galculated Density of Solution (g/ml)	[c / d]:	0.99777	g/mL
: Activity of Dilution by Volume (pCi/r	nL) [e * f]:	2190	pCi/mL on 6/3/92
. Dilution Logbook I.D. #:	Fernews 2		
Prepared By: 3	el tutchiston /J. t	loral Peparation Date:	2/7/95
Reviewed By:	e Helman	Review Date:	<u> 47/95                                    </u>
Purity/Cross Check Performed By:		Check Date	

JECT H-3 LCS	Notebook No. <u>△72  </u> Continued From Page   A
	DARY/WORKING LEVEL ARD DILUTION RECORD
	•
D	ilution Source Information
Isotope:	H-3 LCS
Parent Barcode Number	AC 5299
Vendor or Certificate I.D. # of Parent St	tandard: 2666-1
_ Diluted Source Logbook I.D. #:	LML - 95-721-1
Balance Verification?:	Yes
Diluent Used:	Desdustr
	Dilution
*Diluent:	Desol Water
_ *Density of diluent (g/ml):	0.99
a: Parent Specific Activity:	2190 pc/ml
b: Amount of Source Transferred:	5.0 ml 8 8/14/25
c: Total amount of Dilution:	4000 ml g/1/2/25
d: Total Volume of Dilution:	
e: Activity of Dilution [a * b / c]:	2.71 pc/nl e 6/3/92
f:,Activity of Dilution (a * b / d):	
Dilution Logbook I.D. #:	95-721-14-1
Prepared By:	Preparation Date: 8/24/95
Reviewed By: Que Hatchen	Review Date: 8/24/95
([	used for the dilution source, then a weight dilution of a volume unit source
Il can be benormed without a density conversion.	If the diluent changes, a weighted proportion density conversion is necessary.  Read and Understood By
	2

Signed

Date

# **VALIDATION SUMMARY**

Kearney/Centaur Division A.T. Kearney, Inc. 2952 George Washington Wav Richland, Washington 99352 509 375 5667 Facsimile 509 375 5151

Management Consultants



# -ITKEARNEY

#### 3 December 1995

Ms. Joan Kessner
Bechtel Hanford Incorporated
Post Office Box 969 MSIN H4-23
Richland, Washington 99352

Dear Ms. Kessner:

Enclosed are the Radiochemistry, Wet Chemistry, and Inorganic reports for SDGs No. W0699-QES and LK5379-LAS.

Sincerely,

R. Bruce Christian

Consultant

cc: J. Duncan - CH2

R. Stringer - ATK

J. Goode - ATK

C. Reyes - ATK

Date: Decemi

December 1, 1995

To:

Bechtel Hanford Inc. (technical representative)

From:

A.T. Kearney, Inc.

Project:

100-NR-2 Groundwater Sampling Round 8

Subject: Inorganics - Data Package No. LK5379-LAS (SDG No. LK5379)

#### INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. LK5379-LAS prepared by Lockheed Analytical Services (LAS). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sämple Däte	Media	Validation Level	Analysis
BOGJY4	09/14/95	Water	С	SW-846/ICP Metals
B0GJY5	09/14/95	Water	С	SW-846/ICP Metals

Data validation was conducted in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualifications

Appendix 3. Qualified Data Summary and Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

### DATA QUALITY OBJECTIVES

## Holding Times

Analytical holding times for ICP metals were assessed to ascertain whether the holding time requirements have been met by the laboratory. The holding time requirements for all metals is as follows: Samples must be analyzed within six months.

Holding time requirements were met for all analytes.

#### Blanks

#### Calibration Blanks

A calibration blank must be analyzed immediately after every initial and continuing calibration verification. The blank must be analyzed at the beginning of the run and after the last analytical sample. In the case of positive blank results, samples with digestate concentrations (in ug/L) of less than five times (<5x) the highest amount found in any of the associated blanks have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times (>5x) the highest blank value do not require qualification.

In the case of negative calibration blank results, if the absolute value of any calibration blank exceeds the Instrument Detection Limit (IDL), all non-detects are qualified as estimates and flagged "UJ", and all positive results within two times (2x) the absolute value of the blank result are qualified as estimates and flagged "J". The qualification is applied only to results generated between the calibration blank IDL and the nearest acceptable blank.

Level C validation does not require the qualification of data based on calibration blanks.

#### Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations (in ug/L) of less than five times the preparation blank value have had their associated values qualified as non-detects and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all non-detects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all non-detects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

Due to the presence of a positive preparation blank result, the zinc result in sample number BOGJY4 has been flagged "U".

All other preparation blank results were acceptable.

## Accuracy

#### Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75 to 125 percent. Samples with a spike recovery of less than 30% and a sample value below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified "J". Finally, all samples with a spike recovery greater than 125% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery results were acceptable.

#### Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be digested or distilled and analyzed with every group of samples which have been prepared together. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier).

One liquid LCS is digested and analyzed for each sample batch in this report that contains water samples. The results were compared against the control limit of 80-120% as required by WHC data validation guidelines.

Level C validation does not require the qualification of data based on laboratory control samples.

#### Precision

#### Laboratory Duplicate Samples

The laboratory duplicate result measures the precision of the method by measuring a second aliquot of the sample that is treated the same way as the original. Samples whose precision fell outside the quality control requirements were qualified as estimates and flagged "J".

All laboratory duplicate recovery results were acceptable.

#### ICP Serial Dilution

The ICP serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. If the sample concentration is less than or equal to fifty times the IDL for an analyte and the %D is outside the control limits (greater than 10%), the associated data must be qualified as estimated "J".

Level C validation does not require the qualification of data based on serial dilution results.

### Field Split Samples

Two sets of field splits were associated with SDG No. LK5379, as shown below:

Sample Number	Split Sample Number	Well Location
BOGJS8	B0GJY4	199-N-21
BOGJS9	B0GJY5	199-N-21

Sample B0GJS8 and B0GJS9 were analyzed by Quanterra Environmental Services and reported with SDG W0699-QES. The split sample results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. All results fell within the required control limits.

## Completeness

Data Package No. LK5379-LAS (SDG No. LK5379) was submitted for validation and verified for completeness. The completion rate was 100%.

#### MAJOR DEFICIENCIES

None found.

#### MINOR DEFICIENCIES

Minor positive preparation blank contamination was encountered, resulting in the zinc result for sample BOGJY4 being flagged "U". All other validated results are considered accurate within the standard error associated with the methods.

#### **REFERENCES**

- EPA, 1987, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.
- EPA, 1988c, EPA Contract Laboratory Program Statement of Work for Inorganics Analyses, Multi-Media, Multi-Concentration, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988d, Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1990, EPA Contract Laboratory Program Statement of Work for Inorganic Analyses, Multi-media, Multi-Concentration, U.S. Environmental Protection Agency, Washington, D.C.
- WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2
Summary of Data Qualification

#### **DATA QUALIFICATION SUMMARY**

SDG: LK5379	REVIEWER: RJS	DATE: 12/01/95	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Zinc	U	BOGJY4	Positive preparation blank result

## Appendix 3

**Qualified Data Summary and Annotated Laboratory Reports** 

Project: BECHTEL-	-HANFO	RD		]																	
Laboratory: Lockhe				1																	
Case	SDG: LI	K5379																			
Sample Number		B0GJY4		B0GJY5								l		l							
Location		199-N-	21	199-N-	21							l		<u> </u>							
Remarks		Split		Split		·															
Sample Date		09/14/95		09/14/95			,														
Inorganic Analytes			Q	Result	q	Result	Q	Result	Q	Result	Q	Result	Q	Result	ļΩ	Result	Q	Result	Q	Result	Q
Aluminum	0.2		<u> </u>	0.039			_		<u> </u>			<u> </u>	<u> </u>		<u> </u>		ļ	<u> </u>	<u> </u>		
Antimony	0.06			0.058			ļ		ļ	<u> </u>		ļ <u> </u>	ļ	<u> </u>			ļ	<u> </u>	ļ		$\perp \!\!\! \perp \!\!\! \perp$
Arsenic	0.01	0.098			U		<u> </u>		ļ			<u> </u>	ļ	<u> </u>	<u> </u>		<u> </u>		<u> </u>		
Barlum	0.2	0.030		0.030			<u> </u>		ļ	<u> </u>		<u> </u>	ļ		<u> </u>					<u> </u>	$\perp$
Beryllium	0.005	0.0010		0.0010			ļ		ļ			ļ <u> </u>	<u> </u>		ļ		ļ		ļ		
Cadmium	0.005	0.0050	U	0.0050	<u>υ</u>		<u> </u>		ļ			<u> </u>	<u> </u>		ļ				ļ		ļl
Calcium	5	82		90	_		<u> </u>		L			ļ <u>.</u>	<u> </u>		<u> </u>		ļ				
Chromium	0.01	0.0043		0.0030	U		<u> </u>	<u> </u>	<u> </u>			<u> </u>	<u> </u>		<u> </u>						
Cobalt	0.05	0.0060		0.0076				<u> </u>				<u> </u>	<u> </u>		<u> </u>						1
Copper	0.025	0.0030	U	0.0030			<u> </u>		١			<u> </u>	<u> </u>								
Iron	0.1	0.15		0.012			<u> </u>						<u> </u>		1						
Lead	0.003	0.056	Ü	0.056	υ		<u> </u>		<u> </u>			<u> </u>	<u> </u>								
Magnesium	5	17		18		<u> </u>	<u>L</u>		<u>.                                    </u>		<u>.                                    </u>	<u> </u>	<u> </u>		<u> </u>		<u>L.</u>		<u>L</u>		$oxed{oxed}$
Manganese	0.015			0.0020	U		<u> </u>			<u> </u>		<u> </u>	<u> </u>	<u> </u>	1		1		<u> </u>		
Mercury	0.0002		<u> </u>	NA NA			<u> </u>					<u> </u>	<u> </u>		<u>!</u>		_		<u> </u>		
Nickel	0.04	0.015	U	0,015	Ų_		<u> </u>	<u> </u>	l	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u>L</u>				<u> </u>		
Potassium	5	7.4		7.9					<u> </u>								Ī		<u> </u>		
Selenium	0.005	0.087	U	0.087	υ	ļ	1						<u>                                     </u>						<u> </u>		
Silver	0.01	0.0040	U	0.0040	U			1					Ì								$\Box$
Sodium	5	150		150																	
Thallium	0.01	0.075	1	0.089		i													Ī		
Vanadium	0.05	0.0080	Π	0.0085									I		1		1				
Zinc	0.02	0.019	Ū	0.011		l					Π		$\Box$		1		T		$\Box$		
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## Sample Results

Client Sample ID: BOGJY4	Date Collected: 14-SEP-95
Matrix: Water	Date Received: 16-SEP-95
Percent Solids: N/A	

Constituent	Ünits	Hethod*	Result	Project Reporting Limit	Data Qual	Dilution	Date Analyzed	LAS Batch 1D	LAS Sample ID
ALUMINUM, TOTAL	mg/L	6010	0.035	0.029	В	1	16-0CT-95	27912	L5379-2
ANTIMONY, TOTAL	mg/L	6010	< 0.058	0.058	U	1	16-0CT-95	27912	L5379-2
ARSENIC, TOTAL	mg/L	6010	< 0.098	0.098	u	1	16-001-95	27912	L5379-2
BARIUM, TOTAL	mg/L	6010	0.030	0.021	В	1 _	16-DCT-95	27912	L5379-2
BERYLLIUM, TOTAL	mg/L	6010	< 0.0010	0.0010	Ų	1	16-0CT-95	27912	L5379-2
CADMIUM, TOTAL	mg/L	6010	< 0.0050	0.0050	ч	1	16-0CT-95	27912	L5379-2
CALCIUM, TOTAL	mg/L	6010	82.	0.032		1	16-0CT-95	27912	L5379·2
CHROMIUM, TOTAL	mg/L	6010	0.0043	0.0030	8	1	16-0CT-95	27912	L5379-2
COBALT, TOTAL	mg/L	6010	< 0.0060	0.0060	u	1	16-0CT-95	27912	L5379-2
COPPER, TOTAL	mg/L	6010	< 0.0030	0.0030	u	1	16-0CT-95	27912	L5379-2
IRON, TOTAL	mg/L	6010	0.15	0.012		1	16-0CT-95	27912	L5379-2
LEAD, TOTAL	mg/L	6010	< 0.056	0.056	u	1	16-0CT-95	27912	L5379-2
MAGNESIUM, TOTAL	mg/L	6010	17.	0.050		1	16-0CT-95	27912	L5379-2
MANGANESE, TOTAL	mg/L	6010	0.0042	0.0020	В	1	16-0CT-95	27912	L5379-2
NICKEL, TOTAL	mg/L	6010	< 0.015	0.015	u	1	16-act-95	27912	L5379-2
POTASSIUH, TOTAL	mg/L	6010	7.4	0.60		1	16-0CT-95	27912	L5379-2
SELENIUM, TOTAL	mg/L	6010	< 0.087	0.087	u	1	16-0CT-95	27912	L5379-2
SILVER, TOTAL	mg/L	6010	< 0.0040	0.0040	u	1	16-0CT-95	27912	L5379-2
SODIUM, TOTAL	mg/L	6010	150	0.070		1	16-0CT-95	27912	L5379-2
THALLIUM, TOTAL	mg/L	6010	0.075	0.050	В	1	16-OCT-95	27912	L5379-2
VANADIUM, TOTAL	mg/L	6010	0.0080	0.0040	В	1	16-0CT-95	27912	L5379-2
ZINC, TOTAL	mg/L	6010	0.019	0.0040	1/u	1	16-0CT-95	27912	L5379-2

R-35 11/4/95



#### Sample Results

Client Sample ID: BOGJY5 Date Collected: 14-SEP-95

Matrix: Filt H20 Date Received: 16-SEP-95

Percent Solids: N/A

Constituent	Units	Method	Result	Project Reporting Limit		Dilution	Date Analyzed	LAS:	LAS Sample ID
ALUMINUM, DISSOLVED	mg/L	6010	0.039	0.029	В	1	16-0CT-95	27913	L5379-21
ANTIMONY, DISSOLVED	mg/L	6010	< 0.058	0.058	u	1	16-0CT-95	27913	L5379-21
ARSENIC, DISSOLVED	mg/L	6010	< 0.098	0.098	u	1	16-0CT-95	27913	L5379-21
BARIUM, DISSOLVED	mg/L	6010	0.030	0.021	В	1	16-0CT-95	27913	L5379-21
BERYLLIUM, DISSOLVED	mg/L	6010	< 0.0010	0.0010	u	1	16-0CT-95	27913·	L5379-21
CADMIUM, DISSOLVED	mg/L	6010,	< 0.0050	0.0050	u	1	16-0CT-95	27913	L5379-21
CALCIUM, DISSOLVED	mg/L	6010	90.	0.032		1	16-0CT-95	27913	L5379-21
CHROMIUM, DISSOLVED	mg/L	6010	< 0.0030	0.0030	u	1	16-0CT-95	27913	L5379-21
COBALT, DISSOLVED	mg/L	6010	0.0076	0.0060	В	1	16-0CT-95	27913	L5379-21
COPPER, DISSOLVED	mg/L	6010	< 0.0030	0.0030	u	1	16-0CT-95	27913	L5379-21
IRON, DISSOLVED	mg/L	6010	< 0.012	0.012	u	1	16-0CT-95	27913	L5379-21
LEAD, DISSOLVED	mg/L	6010	< 0.056	0.056	u	1	16-0CT-95	27913	L5379-21
MAGNESIUM, DISSOLVED	mg/L	6010	18.	0.050		1	16-0CT-95	27913	L5379-21
MANGANESE, DISSOLVED	πg/L	6010	< 0.0020	0.0020	3	1	16-0CT-95	27913	L5379-21
HICKEL, DISSOLVED	mg/L	6010	< 0.015	0.015	u	1	16-0CT-95	27913	L5379-21
POTASSIUM, DISSOLVED	mg/L	6010	7.9	0.60		1	16-0CT-95	27913	L5379-21
SELENIUM, DISSOLVED	mg/L	6010	< 0.087	0.087	ч	1	16-0CT-95	27913	L5379-21
SILVER, DISSOLVED	mg/L	6010	< 0.0040	0.0040	ч	1	16-0CT-95	27913	L5379-21
SODIUM, DISSOLVED	mg/L	6010	150	0.070		1	16-0CT-95	27913	L5379-21
THALLIUM, DISSOLVED	mg/L	6010	0.089	0.050	В	1	16-0CT-95	27913	L5379-21
VANADIUM, DISSOLVED	mg/L	6010	0.0085	0.0040	В	1	16-0CT-95	27913	L5379-21
ZINC, DISSOLVED	mg/L	6010	0.011	0.0040	В	1	16-0CT-95	27913	L5379-21

ZJS 11/14/95

45 E

Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146



October 27, 1995

Ms. Joan Kessner Bechtel Hanford, Inc. 345 Hills P.O. Box 969 Richland, WA 99352

RE: Log-in No.:

Quotation No.:

SAF:

Document File No.:

WHC Document File No.: SDG No.:

L5379

Q400000-B B95-093

0916596

274

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LK5379

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 16 September 1995.

The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements with the exception of method 300.0 nitrate-nitrogen, nitrite-nitrogen, and orthophosphate.

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 375-4741.



Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

" I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manger or a designee, as verified by the following signature."

Sincerely.

Kathleen M. Hall

Client Services Representative

cc: Client Services
Document Control

#### Lockheed Analytical Services

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

# CASE NARRATIVE INORGANIC METALS ANALYSES WATERS

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), duplicate sample(s).

#### **Preparation and Analysis Requirements**

All samples were received on September 16, 1995. The samples were logged in as L5379 and were prepared and analyzed in batch 916 bhT.

#### **Holding Time Requirements**

All samples were analyzed within the method-specific holding times.

#### **Method Blanks**

 The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

#### **Internal Quality Control**

All Internal Quality Control were within acceptance limits.

Shellee McGrath Prepared By October 18, 1995 Date



#### Lockheed Analytical Services

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

# CASE NARRATIVE INORGANIC METALS ANALYSES FILTERED WATERS

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), duplicate sample(s).

#### **Preparation and Analysis Requirements**

All samples were received on September 16, 1995. The samples were logged in as L5379 and were prepared and analyzed in batch 916 bhD.

#### **Holding Time Requirements**

All samples were analyzed within the method-specific holding times.

#### **Method Blanks**

 The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

#### **Internal Quality Control**

All Internal Quality Control were within acceptance limits.

Shellee McGrath Prepared By October 18, 1995 Date



Bechtel Hanford, Inc.		CHAIN OF CUSTO	DY/SAN	/IPLE AI	NALYSI	S REQU	EST	5	270		1 of _	. 3.	
Collector At R1220 /M	ONTY MELHOPN	Company Contact J. V. Borghese	<del> </del>		···		Telephone (509) 372			1	around Priority Normal		
Project Designation 100-NR-2 Groundwater Sampling	<i>'</i>	Sampling Location	<u>.</u>	<u> </u>	· · ·	.,	SAF No. 895-093						
Ice Chest No.		Field Logbook No.	FL-1056	-1-1056				Method of Shipment Federal Express					
Shipped To Lockheed	•	Offsite Property No.	te Property No. W95-0-0204-50				Bill of Ladi	ng/Air Bill N	". 290	04640	785		
Possible Sample Hazards/Remark	•	Preservation	нио,	Cool 4°C	Cool 4°C	H,SO.	Cool 4°C	Cool 4°C	None	нио,	None	None	
		Type of Container	P/G	P/G	G	G	P/G	P/G	ρ	P/G	G	P/G	
		No. of Container(s)	1	1	4	1	1	1	1	8	1	1	
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SAMPLE	ICP Metals - TAL (Unfilter- ed)	Anions (IC) - F, CI, SO <sub>4</sub> , PO <sub>4</sub> , NO <sub>2</sub> , NO <sub>3</sub> (Unfiltered)	Oil and Grease	ТРН	Conduct- ivity	Turbidity	βH	Gross Alphs, Gross Bets, Sr-90, Gamma Spec	Tritium	Activity Scan			
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FINAL SAMPLE Disposal Me	Disposed By Date/Time												

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## Appendix 5

**Data Validation Supporting Documentation** 

## WHC-SD-EN-SPP-002, Rev. 2

## INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	А	В	<b>©</b>	D	E
PROJECT: V	OHC/BHI		DATA PACKAGE	: LK 537	7-LAS
VALIDATOR:	225	LAB: LOCK	heed	DATE: Nov.	. 14 1995
CASE: 100-	-NR-2		SDG: ㄴ	K5379	
		ANALYSES	PERFORMED		
[] CLP/ICP	D CLP/GFAA	□ CLP/Hg	CLP/Cyanida	0	o o
<b>Ж</b> sw-в46лср	☐ SW-846/GFAA	□ SW-846/Hg	□ 6W-846 Cyenide	0	٥
SAMPLES/MATR	XIX			•	
	BOG JY4	, 806	JY5		
-21	olit Jample	<u> </u>	(ک سعا	ur Sample	s)
Is technical	AGE COMPLETEN verification rative presen	documentation			es No N/A es No N/A
2. HOLDING T Are sample ho	IMES lding times a	cceptable? .			es) No N/A
Comments:		6 month			

7-19<sup>vs</sup> 000023

## WHC-SD-EN-SPP-002, Rev. 2

## INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS	
Were initial calibrations performed on all instruments? Ye	s No NA
Are initial calibrations acceptable? Ye	s No (NA)
Are ICP interference checks acceptable? Ye	Z'13
Were ICV and CCV checks performed on all instruments? Yes	<i>∠</i> ~
Are ICV and CCV checks acceptable? Yes	s No NA
Comments:	
4. BLANKS	
Were ICB and CCB checks performed for all applicable analyses? Yes	4
Are ICB and CCB results acceptable? Yes	
Were preparation blanks analyzed? Ye	<u>~</u>
Are preparation blank results acceptable? Yes	
Were field/trip blanks analyzed? Yes	s no (N/A)
Are field/trip blank results acceptable? Yes	s No (M/A)
Comments:	
BOGJY4 Zn "U"	
5. ACCURACY	
Were spike samples analyzed?	s) No N/A
Are spike sample recoveries acceptable?	•
Were laboratory control samples (LCS) analyzed? Ye	s No 📆
Are LCS recoveries acceptable? Ye	s No (N/A)
Comments:	
	<del></del>

## WHC-SD-EN-SPP-002, Rev. 2

## INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION	
Were laboratory duplicates analyzed? Yes No N/	/A
Are laboratory duplicate samples RPD values acceptable? Yes No N/	/A
Were ICP serial dilution samples analyzed? Yes No (N)	R
Are ICP serial dilution *D values acceptable? Yes No (N)	D
Are field duplicate RPD values acceptable? Yes No (N/	(A)
Are field split RPD values acceptable? Yes No N/	<b>/</b> A
Comments: / Split 1	_
BOGJY4/BOGJS8 / BOGJY5/BOGJS9	$\checkmark$
	<u> </u>
7. FURNACE AA QUALITY CONTROL	_
Were duplicate injections performed as required? Yes No	( <u>A'</u>
Are duplicate injection *RSD values acceptable? Yes No (N)	
Were analytical spikes performed as required? Yes No	<
Are analytical spike recoveries acceptable? Yes No (N)	
Was MSA performed as required? Yes No $(N)$	ØΑ
Are MSA results acceptable? Yes No M7	PA)
Comments:	<u></u>
8. REPORTED RESULTS AND DETECTION LIMITS	<u> </u>
Are results reported for all requested analyses? Yes No N/	/A
Are all results supported in the raw data? Yes No	(A)
Are results calculated properly? Yes No	7 <u>A</u> )
Do results meet the CRDLs? Yes No N/	/A
Comments:	_
	_
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	<u> </u>

SDG: LK5379		VALIDATO	₹:	Ras		DATE: [[/	14/95	PAGE_L_OF_J				
COMMENTS:						,						
SAMPLE ID	СОМРОИНО	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER			
Prep	Zinc	.0111			mg/L	.0555	0.111	B06JY4	U			
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Date: December 1, 1995

To: Bechtel Hanford Inc. (technical representative)

From: A.T. Kearney, Inc.

Project: 100-NR-2 Groundwater Sampling Round 8

Subject: Wet Chemistry - Data Package No. LK5379-LAS (SDG No. LK5379)

#### INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. LK5379-LAS prepared by Lockheed Analytical Services (LAS). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
BOGJY4	09/14/95	Water	С	See Notes 1,2,3
BOGJY5	09/14/95	Water	С	See Note 1

Note 1. Requested Method: CI, F, NO<sub>3</sub>, NO<sub>2</sub>, SO<sub>4</sub>, PO<sub>4</sub> Note 2. Requested Method: Turbidity, pH, Conductivity

Note 3. Requested Method: TPH, Oil and Grease

Data validation was conducted in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualifications

Appendix 3. Qualified Data Summary and Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

#### DATA QUALITY OBJECTIVES

#### Holding Times

Analytical holding times are assessed to ascertain whether the holding time requirements are met by the laboratory. The holding time requirements are as follows: 28 days for fluoride, chloride, sulfate, specific conductivity and oil and grease; 14 days for total petroleum hydrocarbons; 48 hours for turbidity, nitrate, nitrite and phosphate, and immediately for pH.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

The holding time for nitrate was exceeded by greater than twice the limit for sample numbers BOGJY4 and BOGJY5. Therefore, the associated results, both detects, were qualified as estimates and flagged "J".

The holding time for nitrite was exceeded by greater than twice the limit for sample numbers BOGJY4 and BOGJY5. Therefore, the associated results, both non-detects, were rejected and flagged "UR".

The holding time for phosphate was exceeded by greater than twice the limit for sample numbers BOGJY4 and BOGJY5. Therefore, the associated results, both non-detects, were rejected and flagged "UR".

The holding time for turbidity was exceeded by greater than twice the limit for sample number BOGJY4. Therefore, the associated detected result was qualified as an estimate and flagged "J".

The holding time for pH was exceeded by greater than twice the limit for sample number BOGJY4. Therefore, the associated result was qualified as an estimate and flagged "J".

The Oil and Grease method requires that water samples be preserved with 5 ml of HCl if analysis will not be performed within several hours of sampling. No preservatives were added to the aliquot of sample BOGJY4 which was used for Oil and Grease analysis, nor was the sample analyzed within several hours of sampling. Therefore, since the Oil and Grease result was non-detected, the result has been rejected and flagged "UR".

Holding times were met for all other analytes.

#### Instrument Calibration

Instrument calibration is performed to establish that the instrument is capable of producing acceptable and reliable analytical data over a range of concentrations. The initial and continuing calibrations are performed according to the associated EPA Methods and all results must meet validation requirements set by Westinghouse Hanford Company (WHC 1992,b). At least one blank and three standards were used to establish the instrument calibrations prior to sample analysis and the correlation was greater than or equal to 0.995. Continuing

calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

Instrument calibration is not evaluated under Level C validation.

#### Blanks

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. All blank results must fall below the CRQL and if not, all associated data less than five times the amount found in the blank are qualified as non-detected "U".

All method blank results were acceptable.

#### Accuracy

#### Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75 to 125 percent. Samples with a spike recovery of less than 30% and a sample value below the IDL were rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified "J". Finally, all samples with a spike recovery greater than 125% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery results were acceptable.

#### Laboratory Control Sample

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be prepared (e.g., digested or distilled) and analyzed with every group of samples which have been prepared together. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier). If the LCS recoveries are outside the control limit and the sample result is greater that the IDL, all sample results must be qualified as estimates and flagged "J". If the LCS recoveries are less than the control limit and the sample result is less than the IDL, all sample results must be

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flagged "UJ". If the LCS recoveries are greater than the control limits and the sample result is less than the IDL, then no qualification is necessary. The performance criteria for aqueous LCS samples are percent recoveries between 80% and 120%. Samples with LCS recoveries of less that 50% are rejected and flagged "UR/R". Samples with LCS recoveries between 50% and 79% and a sample value below the IDL are qualified as estimates and flagged "UJ". If the LCS recovery is greater than 120% or between 50% and 79% and a sample value above the IDL, the result is qualified as an estimate and flagged "J". For LCS recoveries greater than 120% and a sample value below IDL, no qualification is necessary.

LCS results are not evaluated under Level C validation.

#### Precision

#### Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of +/-35%. If RPD values are out of specification and the sample concentration is >5xCRDL, all associated sample results are qualified as estimated "J" for detects, "UJ" for non-detects. If RPD values are plus or minus two times the CRDL (+2xCRDL) and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J" for detects and "UJ" for non-detects. The performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the CRDL or plus or minus the CRDL(+CRDL) for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J".

All laboratory duplicate results were acceptable.

#### Field Split Samples

Two sets of field splits were submitted to LAS as shown below:

Sample Number	Split Sample Number	Well Location				
BOGJS8	B0GJY4	199-N-21				
BOGJS9	B0GJY5	199-N-21				

Sample B0GJS8 and B0GJS9 were analyzed by Quanterra Environmental Services and reported with SDG W0699-QES. The split sample results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. All results fell within the required control limits.

#### Completeness

Data Package No. LK5379-LAS (SDG No. LK5379) was submitted for validation and verified for completeness. Nitrite and phosphate results for both samples were rejected due to exceeded holding times, resulting in a completion rate of 69%.

#### **MAJOR DEFICIENCIES**

Due to exceeded holding times, nitrite and phosphate results for both samples were rejected and flagged "UR". Due to the lack of preservation, the Oil and Grease result in sample BOGJY4 was rejected and flagged "UR". Rejected results are not usable for any purposes and should not be reported.

#### MINOR DEFICIENCIES

Due to exceeded holding times, pH, nitrate and turbidity results have been qualified as estimates and flagged "J". Data flagged "J" indicate the associated concentration is an estimate, but the data are usable for decision making purposes. All other validated results are considered accurate within the standard error associated with the methods.

#### REFERENCES

- EPA, 1987, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.
- EPA, 1991b, EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration, U.S. Environmental Protection Agency, Washington, D.C.
- WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.

## Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2

**Summary of Data Qualification** 

### DATA QUALIFICATION SUMMARY

SDG: LK5379	REVIEWER: RJS	DATE: 12/01/95	PAGE <u> 1</u> OF <u> 1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
рН	J	B0GJY4	Holding time exceeded
Turbidity	j	B0GJY4	Holding time exceeded
Nitrate	J	BOGJY4, BOGJY5	Holding time exceeded
Nitrite	UR	BOGJY4, BOGJY5	Holding time exceeded
Phoshpate	UR	BOGJY4, BOGJY5	Holding time exceeded
Oil and Grease	UR	BOGJY4	No Preservation

## Appendix 3

**Qualified Data Summary and Annotated Laboratory Reports** 

DEOUTEL	HANGO	<del>DD</del>		1																	
Project: BECHTEL- Laboratory: Lockhe	HANFO	KD																			
Case	SDG: L	K5270																			
Sample Number	SDG. L	BOGJY4		B0GJY5		l				· · · ·						<u> </u>		T		1	
Location		199-N-			.21	<del> </del>							···								
Remarks	-	Split	6- I	Split								<del> </del>				<del> </del>		<del> </del>			
Sample Date		09/14/95		09/14/95		<b></b>										-					
General Chemistry	Method	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	a	Result	O	Result	O	Result	ПО
Chloride	300.0	20	-	20									<u> </u>								†
Fluoride	300.0	0.1	U	0.1	U								<u> </u>								1
Nitrate - N	300.0	8,1		8.3									Г								1
Nitrite-N	300.0	0.01		0.01	UR				l				_					i		· · · · · · · · · · · · · · · · · · ·	1
Ortho-Phosphate	300.0	0.1		0.1	UR			i		<u> </u>								<del>                                     </del>			
Sulfate	300.0	300		300									<b></b>					l			1
Spec. Conductance	120.1	1100		NA				i — —					_								1
Turbidity	180.1	0.64	J	NA				i——			-		ļ				i				1
pH	9040	7.8	J	NA																	1
Oil and Grease	413.1	5.00	UR	NA							Ī										
TPH	418.1	1.00	U	NA													ī				
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#### COMMON IONS AND ADDITIONAL ANALYTES

### Sample Results

Client Sample ID: BOGJY4	Date Collected: 14-SEP-95
Matrix: Water	Date Received: 16-SEP-95

Constituent :	CUnits	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Specific Conductance	uS/cm	120.1	1100,	- 1		26-SEP-95	27575	L5379-9
Turbidity	UTH	180.1	0.64	N/A	XJ	23-SEP-95	27708	L5379-10
Chloride	mg/L	300.0	20.	0.02		20-SEP-95	27576	L5379-3
Fluoride	mg/L	300.0	< 0.1	0.1	U	20-SEP-95	27578	L5379-3
Nîtrate-N	mg/L	300.0	8.1	0.02	XJ	20-SEP-95	27580	L5379-3
Nitrite-N	mg/L	300.0	< 0.01	0.01	JY UR	20-SEP-95	27582	L5379-3
Ortho Phosphate	mg/Ł	300.0	< 0.1	0_1	YUR	20-SEP-95	27584	L5379-3
Sulfate	mg/L	300.0	300	1	D(1:10)	20-SEP-95	27586	L5379-3
pH	pH Units	9040	7.8	0.1	XJ	22-SEP-95	27656	L5379-11

Z35 114195

OIL AND GREASE - GRAVIMETRIC METHOD 413.1 OIL AND GREASE

> Client Sample ID: Date Collected: Date Analyzed:

B0GJY4 14-SEP-95

28-SEP-95

Matrix: QC Group: Water

413.1 OIL AND GREASE\_27944

LAL Sample ID: L5379-4
Date Received: 16-SEP-95
Date Extracted: 28-SEP-95

Analytical Batch ID: 092895-413.1

Dilution Factor: 1

PRAUDICAL DATA
RESULT QUANTITATION LIMIT QUALIFIER(E) CONSTITUENT

Total Oil and Grease

RBC 12/1/95

TOTAL PETROLEUM HYDROCARBONS BY FTIR 418.1 TPH

Client Sample ID: Date Collected:

BOGJY4 14-SEP-95 26-SEP-95

Date Analyzed: Matrix:

Water

QC Group:

418.1 TPH\_27753

LAL Sample ID:

L5379-8 16-SEP-95

Date Received: 16-SEP-95 Date Extracted: 25-SEP-95

Analytical Batch ID: 092695-418.1

Dilution Factor: 1

PRACTICAL PATA

CONSTITUENT RESULT QUANTITATION LIMIT QUALIFIER(E)

EG/L EG/L

TRPH

<1.00 U

1.00

RJS 1114195

#### LOCKHEED ANALYTICAL SERVICES

#### COMMON IONS AND ADDITIONAL ANALYTES

#### Sample Results

Client Sample ID: BOGJY5	Date Collected: 14-SEP-95
Matrix: Filt H20	Date Received: 16-SEP-95

Constituent	Units	Method		Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Chloride	mg/L	300.0	20.	0.02		20-SEP-95	27577	L5379-22
Fluoride	mg/L	300.0	< 0.1	0.1	U.	20-SEP-95	27579	L5379-22
Nitrate-N	mg/L	300.0	8.3	0.02	ж Д	20-SEP-95	27581	L5379-22
Nitrite-N	mg/L	300.0	< 0.01	0.01	XUR	20-SEP-95	27583	L5379-22
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	A UR	20-SEP-95	27585	L5379-22
Sulfate	mg/L	300.0	300	1	D(1:10)	20-SEP-95	27587	L5379-22

RJ5 1/14/05

Laboratory Narrative and Chain-of-Custody Documentation

**Data Validation Supporting Documentation** 

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value.

  The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Laboratory Narrative and Chain-of-Custody Documentation

Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146



October 27, 1995

Ms. Joan Kessner Bechtel Hanford, Inc. 345 Hills P.O. Box 969 Richland, WA 99352

RE: Log-in No.: L5379

 Quotation No.:
 Q400000-B

 SAF:
 B95-093

 Document File No.:
 0916596

 WHC Document File No.:
 274

SDG No.: LK5379

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 16 September 1995.

The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements with the exception of method 300.0 nitrate-nitrogen, nitrite-nitrogen, and orthophosphate.

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 375-4741.

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

" I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manger or a designee, as verified by the following signature."

Sincerely,

Kathleen M. Hall

Client Services Representative

cc: Client Services

**Document Control** 

Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

# CASE NARRATIVE INORGANIC NON METALS ANALYSES WATER

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

#### Preparation and Analysis Requirements

 One water sample was received for LK5379 and analyzed in batches 916 bh and 916 bht for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL#		Method
BOGJY4	L5379-9	DUP	120.1 Conductivity
	L5379-10	DUP	180.1 Turbidity
	L5379-3	MS, DUP	300.0 Chloride, Fluoride, Nitrate-Nitrogen, Nitrite-Nitrogen, Orthophosphate, Sulfate

#### **Holding Time Requirements**

 All samples were analyzed within the method-specific holding time with the exception of Method 180.1 Turbidity, Method 300.0 Nitrate-Nitrogen, Nitrite-Nitrogen and Orthophosphate which were received outside of holding time. The associated samples are flagged with an "H".

#### Method Blanks

 The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

#### Internal Quality Control

All Internal Quality Control were within acceptance limits.

Kay McCann Prepared By October 15, 1995 Date

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Log-in No.: L5379 Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

# CASE NARRATIVE INORGANIC NON-METALS ANALYSES FILTERED WATER

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

#### **Preparation and Analysis Requirements**

 One filtered water sample was received for LK5379 and analyzed in batch 916 bhd for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL#		Method
BOGJY5	L5379-22	MS, DUP	300.0 Chloride, Fluoride, Nitrate-Nitrogen, Nitrite-Nitrogen, Orthophosphate, Sulfate

#### **Holding Time Requirements**

 All samples were analyzed within the method-specific holding time with the exception of Method 300.0 Nitrate-Nitrogen, Nitrite-Nitrogen and Orthophosphate which were received outside of holding time. The associated samples are flagged with an "H".

#### **Method Blanks**

 The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

#### **Internal Quality Control**

All Internal Quality Control were within acceptance limits.

Kay McCann Prepared By October 15, 1995 Date

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			No. of Container(s)	1	1	4	1	1	1	1	8	1	1	
Special Handling and/or Store Maintain samples between 2			Volume	500mL	500mL	1L	1L	250mL	250mL	250mL	1L	500mL	20mL	
	LE ANALYSIS			ICP Metals - TAL (Unfilter- ed)	Anione (IC) • F, CI, SO <sub>4</sub> , PO <sub>4</sub> , NO <sub>2</sub> , NO <sub>2</sub> (Unfiltered)	Oit and Grease	ТРН	Conduct- ivity	Turbidity	рН	Gross Alpha, Gross Bata, Sr-90, Gamma Spac	Tritium	Activity Scan	
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			Type of Container	P/G	P/G									
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Collector AL AZZO		erack (M)	Company Contact	•				Telephor (509) 37			1	Mormal
Project Designation 100-NR-2 Groundwater Sa	<del></del>		J. V. Borghese Sampling Location 100 N					SAF No. B95-093		<u> </u>		
Ice Chest No GR-15	•	•	Field Logbook No.	<u></u>				Federal I	of Shipment Express			
Shipped To Lockhed	<u> </u>		Offsite Property No.	N95- (	0-0304 50			Bill of Leding/Air Bill No. 290464078				785
Possible Sample Hazards/R	emerks .		Preservation	HNO,	Cool 4°C			1	T	]	]	
	.,	<del></del>	Type of Conteiner	P/G	P/G					<del>                                     </del>		
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·	APLE ANALYSIS			ICP Metals - TAL (Filtered)	Arione (ICI • F, CL SO, PO, HO, HO, Filtered							
Sample No.	Matrix*	Date Sampled	Time Sampled	1	J							
B0G-175	₩ .	9/14/45	1355	X	X		<u> </u>	<u> </u>	<u> </u>	<u> </u>		
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Helindrighted Byzzuen Gra	Date/Tyre	1515 Received By	B WASSED PARTIE	70 /575- /4-55 710	requested holding tim	on lliw se	t be met.	The ERC C	ontractor ac	knowledger	thet the	20 - 52 20 - 52 20 - 52 20 - 62 20 - 62
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LABORATORY Receive SECTION	d By	den Al	Sayle Ca, A	belin				•		ste/Time / 6-95	092.	
FINAL SAMPLE Dispose	i Method			Dis	posed By					ete/Time	·	

### GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	В	(C)	D	E
PROJECT: W	HC/BHI		DATA PACKAGE	: LK537	9-LAS
VALIDATOR: 1	272	LAB: Lock	iheed	DATE: Nov.	14, 1995
CASE: (00 -	- ルスーユ		SDG: L	K5379	
		ANALYSES	PERFORMED	,	
DitenoinA K	В тос	□ тох	<b>7</b> € TPH-418.1	Oil and Great X	Alkalinity
☐ Ammonis	□ BOD/COD	154 Chlorida	☐ Chromium-VI	XI pH	□ NO,NO,
X Sulfete	□ TDS	□ TKN	Phoephate	0	D
XFluoride	\$ Spec Lond.	A Torbidity	M Nitrote	& Nitrite	0
SAMPLES/MATR	IX ·			<del>-</del>	
<u></u>		JY4 , B	06545	(	-2ter)
	-8-0/		Heris) Ro		
<u> </u>	10.00	und indoke	9	- High A 2	
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s technical	AGE COMPLETEN verification rative presen	ESS AND CASE	present? .		ES NO N/A ES NO N/A
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s technical s a case nar comments:  HOLDING T	verification rative presen	ESS AND CASE documentation	present? .		es No N/A
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HOLDING Tore sample horoments:  F, Cl,  Spec (C)  TPH  (C)   + 6re	verification rative presentive pr	cceptable?	present?	reservative ( time limit	es No N/A
HOLDING Tore sample horoments:  F, Cl,  Spec (C)  TPH  (C)   + 6re	verification rative presenting times a source from the second source from the second s	cceptable? .	present?	reservative c time limit	es No N/A

#### MUC-30-54-351-005 .... -

## GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION		6
Was initial calibration performed for all applicable analyses? Yes	No	MZA
Are initial calibration results acceptable? Yes	No	(A)
Was a calibration check performed for all applicable analyses? Yes	No	N/A
Are calibration check results acceptable? Yes		N/A)
Community:		
·		
4. BLANKS		
Were laboratory blanks analyzed?	) No	N/A
Are laboratory blank results acceptable? Yes		N/A
Were field/trip blanks analyzed? Yes	/	N/A
Are field/trip blank results acceptable? Yes		(17A)
Comments:		
		<del></del>
5. ACCURACY		
Were spike samples analyzed at the required frequency? Yes	s No	N/A
Are spike recoveries acceptable?	No (	N/A
Were LCS analyses performed at the required frequency? Yes	s No	MT A
Are LCS recoveries acceptable? Yes	s No	n(À)
Comments:		
6. PRECISION		
Were laboratory duplicate samples analyzed at the required frequency?	> No	N/A
Are laboratory duplicate sample RPD values acceptable? Yes	s) No	N/A
Are field duplicate RPD values acceptable? Yes	s No	(N/A)
Are field split RPD values acceptable? Ye	No P	N/A

## GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments: Field Splits   BOGJY5 / BOGJS	9 \	_
7. ANALYTE QUANTITATION Was analyte quantitation performed properly? Yes Comments:	No	N/A
8. REPORTED RESULTS AND DETECTION LIMITS Are results reported for all requested analyses? Yes	No	N/A
Are results supported in the raw data? Yes	No	hØ
Are results calculated properly? Yes	No	€77A
Do results meet the CRDLs?	No	N/A
	· · · · · · · · · · · · · · · · · · ·	
	<del>,</del>	
		<del></del>
	<del></del>	

## HOLDING TIME SUMMARY

SDG: LK53	379	VALIDATOR:	RAS		DATE: 1114 95	PAG	EOF
COMMENTS:							
FIELD SAMPLE	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOGJY4	PH	9/14/95	NA	9 22 95	N/K	8	J
	,	, (		\	· · · · · · · · · · · · · · · · · · ·		
B06744	Turbility	9/14/95	97425 95 (V)	) 9 23 95	W/A	9	<u>J</u>
1306 J 74	Notrate	9/14/95	NIA	9/20/95	N/k	9	<u>J</u>
BOGJYS	1	->>		4/20/95	<u> </u>	6	U
800-11	Natrite	9/14/95	1 .	010.105	NA	6	130
B06774 B06775	Printe	9/14/95	N/A	9/20/95		6	UR UR
B06J74	Phosphate	9/14/95	NF	9/20/15	h( <i>\tr</i>	6	UR.
BOGIYS	4	9/14/95	1	9/20/45	, V	و	UR.
<u></u>							

Date: December 1, 1995

To: Bechtel Hanford, Inc. (technical representative)

From: A.T. Kearney, Inc.

Project: 100-NR-2 Groundwater Sampling Round 8

Subject: Radiochemistry - Data Package No. LK5379-LAS (SDG No. LK5379)

#### INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. LK5379-LAS prepared by Lockheed Analytical Services (LAS). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
B0GJY4	09/14/95	Water	С	See Note 1

Note 1. Requested Method: Gross Alpha/Beta, Gamma Spectroscopy, and Tritium.

Data validation was conducted in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Qualified Data Summary and Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

#### DATA QUALITY OBJECTIVES

#### Holding Times

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analyses is six months.

All holding times were acceptable.

#### Instrument Calibration and Performance

Instrument calibration is performed to establish that the counters used to determine radionuclide activities are capable of producing acceptable and reliable analytical data. Each counting system must be factory calibrated at installation and after any maintenance or repair. Calibration consists of an instrument efficiency determination for each applicable radionuclide. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

Initial and continuing calibration is not considered under level C validation.

#### Blanks

#### Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers were applied: All positive sample results less than five times the highest blank concentration were qualified as estimated; sample results below the MDA were elevated to the MDA and qualified as undetected; sample results above the MDA and greater than five times the highest blank concentration were not qualified.

All blank results were acceptable.

#### Accuracy

Accuracy is evaluated by analyzing distilled water samples spiked with known quantities of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70 to 130 percent, and 60 to 140 percent for matrix spike samples. Spike sample results outside the above ranges resulted in associated sample results being qualified as estimated, rejected, or not qualified, depending on the activity of the individual sample.

All accuracy results were acceptable.

#### Precision

#### **Duplicate Analysis**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not

performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 35 percent for soil samples and 20 percent for water samples, the results are acceptable. If either activities are less than five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimates.

All precision results were acceptable.

#### Field Split Samples

One split sample pair was submitted to LAS as shown below:

Sample Number	Split Sample Number	Well Location
B0GJS8	B0GJY4	199-N-21

Sample BOGJS8 was analyzed by Quanterra Environmental Services and reported with SDG W0699-QES. The split sample results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. The RPD for gross beta was outside QC limits (31%). Lockheed analyzed for Ac-228, Pb-212, Pb-214, Ra-226, Ru-106 and U-235 while no such analysis was conducted by Quanterra. All other results fell within the required control limits. Under WHC guidelines, no qualification is required.

#### Completeness

Data Package No. LK5379-LAS (SDG No. LK5379) was submitted for validation and verified for completeness. The completion rate was 100%. The MDA did not meet the CRDL for the following compounds: Ra-228, Eu-152, Eu-155, Fe-59, Ra-226, Ru-106, and U-234. Under WHC guidelines, no qualification is required.

#### MAJOR DEFICIENCIES

None found.

#### **MINOR DEFICIENCIES.**

None found.

#### **REFERENCES**

WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.

WHC, 1992b, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-001, Rev. 1, Westinghouse Hanford Company, 1993.

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows:

- Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.
- UJ Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.
- Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2
Summary of Data Qualification

## DATA QUALIFICATION SUMMARY

SDG: LK5379	REVIEWER: RBC	DATE: 12/01/95	PAGE_1_OF_1_
COMMENTS: No	Qualifiers Assigned		
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

**Qualified Data Summary and Annotated Laboratory Reports** 

Project: BECHTEL-HANFORD			ו																	
Laboratory: Lockheed			1																	
Case   SDG: I	K5379		1																	
Sample Number	B0GJY4		<del> </del>		1				Γ		T		<del></del>		1		Т		<del></del>	
Location	199-N-		<u> </u>		<del></del>	-	<del> </del>		f		<del> </del>		<del> </del>		<del> </del>		<del></del>		<del> </del>	
Remarks	Split								<u> </u>		<del></del>		<del> </del>		<del> </del>		<del> </del>			
Sample Date	09/14/98	5			<del> </del>				<del> </del>				<del> </del>		· <del> </del>		<del> </del>		<del></del>	
Radiochemistry Analysis	Result	Q	Result	Q	Result	Q	Result	īQ	Result	TO	Result	To	Result	ī	Result	ī	Result	ה	Result	O
Gross Alpha	1.80	Ū				1	<u> </u>		<u> </u>			1		T	1	1	11100011	1	1150412	-
Gross Beta	7.9						i	<del>                                     </del>	1	1		i		1	<del> </del>	$\vdash$		<u> </u>	<del></del>	<del> </del>
Tritium	1360	1	(			1		i –	1	i	1	_		$\vdash$	<u> </u>		<u> </u>			<del> </del>
Ac-228(Ra-228)		U							[	Г		Γ_		<u> </u>	1	İ		T -		_
Co-58	2.50								T	Π		Γ	1		<del> </del>	<u> </u>	<del>                                     </del>	<u> </u>		
Co-60	-0.5	U			[							i		$\vdash$		IТ			-	_
Cs-137	4.1	υ		Γ-		1										<del>                                     </del>	<del>                                     </del>	-		
Eu-152	-4	U								Г						<del>                                     </del>				_
Eu-154	-6.7	Ū				1				1		i		_		i —	<del> </del>	<b></b>	<del></del>	
Eu-155	6	U														<del> </del>				
Fe-59	-1.3	Ū				1								_		<del> </del>				
Pb-212	4.7	U				1								_	<del></del>	<del>                                     </del>		-		<del> </del> -
Pb-214(Ra-226)	-3.5					$\Box$														$\Box$
Ra-226(Gamma)	110.0	U	" '\													_		_		<del>  </del>
Ru-106	-20.00	υ														<del> </del>				
U-235(Gamma)	-5.0													_		$\vdash$				$\neg$
Strontium	0.67	U				Г				_						$\vdash$				
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RBC 12/1/95

#### LOCKHEED ANALYTICAL SERVICES

#### RAD DATA REPORT (ra01)

#### Bechtel Hanford, Inc. \* Richland, WA

#### Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BOGJY4

LAL Sample ID: L5379-12

Date Collected: 14-SEP-95

Date Received: 16-SEP-95

Matrix:

Login Number: L5379

Constituent	Analyzed	Batch	Activity	Errar	MDA	DataQ	Ual Units
Ac-228(Ra-228)	16-0CT-95	GAMMA SPEC LAL-0063 27809	5. <i>Ų</i>	22.	40.		pCi/L
Co-58	16-0CT-95	GAMMA SPEC LAL-0063 27809	2.5	5.7	9.6		pCi/L
Co-60	16-0CT-95	GAMMA SPEC LAL-0063 27809	-0.5	1.5	12.		pCi/L
Cs-137	16-0CT-95	GAMMA SPEC LAL-0063 27809	4.1	7.3	9.4		pCi/L
Eu-152	16-0CT-95	GAMMA SPEC LAL-0063 27809	-4.0	8.1	36.		pCi/L
Eu-154	16-0CT-95	GAMMA SPEC LAL-0063 27809	-6.7	4.2	34.		pCi/L
Eu- 155	16-OCT-95	GAMMA SPEC LAL-0063 27809	6.	13.	18.		pCi/L
Fe-59	16-OCT-95	GAMMA SPEC LAL-0063 27809	-1.3	9.0	27.		pCi/L
Pb-212	16-0CT-95	GAMMA SPEC LAL-0063 27809	4.7	9.4	13.		pCi/L
Pb-214(Ra-226)	16-0CT-95	GAMMA SPEC LAL-0063 27809	-3.5	8.4	17.		pCi/L
Ra-226(GAMMA)	16-OCT-95	GAMMA SPEC LAL-0063 27809	-110	100	160		pCi/L
Ru-106	16-OCT-95	GAMMA SPEC LAL-0063 27809	-20.	39.	74.		pCi/L
U-235(GAMMA)	16-OCT-95	GAMMA SPEC LAL-0063 27809	-5.	26.	41.		pCi/L
Gross Alpha	11-OCT-95	GR ALP/BETA LAL-0060 27812	1.8 💃	3.2	5.8	C	pCi/L
Gross Beta	11-0CT-95	GR ALP/BETA LAL-0060 27812	7.9	3.4	5.1	С	• pCi/L
Total radio-strontium	20-SEP-95	SR-90 LAL-0196_27451	0.67 <b>U</b>	0.61	1.0		pCi/L

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BOGJY4

LAL Sample ID: L5379-20

Date Collected: 14-SEP-95 Date Received: 16-SEP-95

Matrix:

Water

Login Number: L5379

	Anatyzed	Batch	Activit		MOA	DataQual Units
н-3	02-OCT-95	TRITIUM(H3) LAL-0066_27851	1360	360	320	pCi/L

PBC 12/1/95 -09/JK

Laboratory Narrative and Chain-of-Custody Documentation

Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146



October 27, 1995

Ms. Joan Kessner Bechtel Hanford, Inc. 345 Hills P.O. Box 969 Richland, WA 99352

RE: Log-in No.:

Quotation No.: SAF:

Document File No.: 0916596 WHC Document File No.: 274

SDG No.: LK5379

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 16 September 1995.

L5379

B95-093

Q400000-B

The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements with the exception of method 300.0 nitrate-nitrogen, nitrite-nitrogen, and orthophosphate.

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 375-4741.

003ffx

Log-in No.: L5379

Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

" I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manger or a designee, as verified by the following signature."

Sincerely,

Kathleen M. Hall

Client Services Representative

cc: Client Services

**Document Control** 

-00 MM

Log-in No.: L5379

Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

## CASE NARRATIVE RADIOCHEMICAL ANALYSES

The routine calibration and quality control (QC) analyses performed for this batch include as applicable: instrument calibration, initial and continuing calibration verification, quench monitoring standards, instrument background analysis, method blanks, yield tracer, laboratory control samples, matrix spike samples, duplicate samples.

NOTE:

Chemical recoveries and minimum detectable activities (MDAs) can be found on the preparation sheets and calculation sheets on the attached raw data for each method.

#### **Holding Time Requirements**

All holding times were met.

#### **Analytical Method Gamma Spectrometry**

The gamma spectrometry analysis was performed using standard operating procedure (SOP), LAL-91-SOP-0063. The samples were analyzed in workgroup 27809. No problems were encountered during the analysis and all QC criteria were met. No re-analyses were performed.

#### Analytical Method Gross Alpha/Beta

The gross alpha/beta analysis was performed using SOP, LAL-91-SOP-0060. The samples were analyzed in workgroup 27812. No problems were encountered during the analysis and all OC criteria were met with the following exception: The MDA exceeded the reporting detection limit due to the residue weight limitations forcing a volume reduction, the associated samples were flagged with a "C" qualifier. No re-analyses were performed.

#### **Analytical Method Strontium-90**

The strontium-90 analysis was performed using SOP, LAL-91-SOP-0196. The samples were analyzed in workgroup 27451. No problems were encountered during the analysis and all QC criteria were met. No re-analyses were performed.

-01PK

Log-in No.: L5379

Quotation No.: Q400000-B

SAF: B95-093

Document File No.: 0916596 WHC Document File No.:274

SDG No.: LK5379

#### **Analytical Method Tritium**

The tritium analysis was performed using SOP, LAL-91-SOP-0066. The samples were analyzed in workgroup 27851. No problems were encountered during analysis and all QC criteria were met. No re-analyses were performed.

Andrea Tippett Prepared By October 17, 1995 Date

DIFF

Bechtel Hanford, Inc.		СН	AIN OF CUSTO	DY/SAN	/IPLE A	NALYSIS	S REQU	EST	5	279	Page Data Turna	1_ of _	. 2		
Collector AL RIZZO /M	IONT / M	ELHORN	Company Contact J. V. Borghese			<del></del>	<del></del>	Telephone (509) 372				☐ Priority ■ Normal			
Project Designation 100-NR-2 Groundwater Samplin	<del></del>		Sampling Location 100 N	annianing account					SAF No. 895-093						
Ice Chest No.	<u> </u>			FL-1056				Method of Shipment Federal Express							
Shipped To Lockheed	•		Offsite Property No.	5-0-	0204	-50		Bill of Ladi	ng/Air Bill f	" 290	24640	785	_ <sub>+</sub> ,		
Possible Sample Hazards/Remark	ks		Preservation	HNO₃	Cool 4°C	Cool 4°C	H₂SO₄	Cool 4°C	Cool 4°C	None	HNO <sub>3</sub>	None	None		
			Type of Container	P/G	P/G	G	G	P/G	P/G	Р	P/Ġ	G	P/G		
			No. of Container(s)	1	1	4	1	1	1	1	8	1	1		
Special Handling and/or Storage Maintain samples between 2°C			Volume	500mL	500mL	1 L	1L	250mL	250mL	250mL	1L	500mL	20mL		
SAMPLE	ANALYSIS			ICP Metals - TAL (Unfilter- ed)	Anions (IC) - F, Ci, SO <sub>4</sub> , PO <sub>4</sub> , NO <sub>2</sub> , NO <sub>3</sub> (Unfätered)	Oil and Grease	TPH	Conduct- lvity	Turbidity	pН	Gross Alpha, Gross Beta, Sr-90, Gamma Spec	Tritium	Activity Scan		
3 de 14 14 A	Antein*	Date Sampled	Time Sampled	<u> </u>	1 .	<u> </u>	1		<u> </u>	- V	T	X	TV		
2	w	9/14/53-	/355	X	X	X	X	X	X	X	X		X		
0															
													<u> </u>		
CHAIN OF POSSESSION		Sign/Print I	Names	<u> </u>	Sample ar	INSTRUCTION	hosphate,	nitrate, and	nitrite by El	PA 300.0;	pH by	Matrix*			
Vell a Shitter Butited	75 17/2		Date/Ti	me	SW-846 S	040: and t	urbidity by	EPA 180.1	are being re	equested fo	or informatio vill not be me	SL - SIUW - Wa O - Oil A - Air OS - Dru DL - Dru T - Ter Wi - Wij	olid udge ata: ! ! um Solids um Liquids asue		
	nte/Time	Received By	Date/Ti Title	me					D	ato/Jimo		V - Ve( X - Otr	gatation		
LABORATORY Received B	Mu	th	Snok (n	shodin					4.	16.35	10720				
FINAL SAMPLE Disposal M	ethod			Di	sposed By					ate/Time					

	VINOW OSSI	Melhorn	Company Contact J. Y. Sorghess					Telephone (509) 372		······································		O Priorit Name
Project Designation 100-NR-2 Groundwe	rter Sampling - Round	id .	Sampling Location 100 M	•			•	BAF No. B98-093			-	
Ice Cheet No.	:15	•	Reid Logback No.	Ft-1056	e	<del></del>		La a a m.	Shipment			
Shipped To			Officite Property No.		oaoq	.50		Bill of Lad	ng/Ak Mik I	No. 73 G	24640	785
Leokiteed Pezsible Sample Has	neslejflemerke -		Preservedon	HNO.		Cool 4°C	H <sub>2</sub> 50,	Good 4°G		r	HHO,	None
			Type of Container	P/G	PAG	,0	a	P/G	PAG	P	PXG	6
			No. at Cantelnarie)	7,0			1	1	1	1	8	,
Special Handling and Maintain campies be	ios Stotega	<u></u>	Volume	500mL	600mL	11.	11.	250mL	250mL	280mL	11	500m
MMINIMA EMPRIME DA	sämple analysi	\$ · ·		JCP Materia - TAL (Unfitzer- ed)	Arione (IC) - F. C., SO., PO., HO., (Unitiered)	OH and Greens	TP))	Cenduct- lyity		pH .	Green Alpha, Green Beta, SI-90, Garrera Spee	Tritken
Sample No.	Matrixa	Date Semples	Time Sampled									
809.JY4	.W.	2/14/12-	/355	X	X	X		×	X	×	×	->
			<u> </u>					<u> </u>			<del> </del>	-
			<u> </u>								-	-
	[		<u> </u>					<b> </b>			<del> </del>	
										<b> </b> -	<u> </u>	
CHAIN OF POSSESS	1014	Sign/Pánt	Names		Sample 44	STRUCTION PLANTS	bearbets.	ndrate, and t	rizite by El	PA 200.0;	pHby	N <sub>e</sub> s
Helipsychological State of Republication of the Part of the Indian State of the Indian	Ger Ontellime	2200 Received By	Badshu Prop Datellin		2W-246 S orly. The	040; and 11 ERC Cantri	· ictor ackti ictor ackti	swiedges fü	ara basing ra at the holdi	uð gurga <i>e</i> Iðræ <b>stan</b> st	e fetormatic dit sot be m	91. SE
Relinquished By	Qats/Time	Ascelved By	Date/Tin								;	CS CL W
	Datustime	firesived By	Date/Tin	10								Ų,

# Appendix 5

**Data Validation Supporting Documentation** 

# RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	Α	В			D		E	
PROJECT: ) C	00-NR-	ર .	DATA	PACKAG	E: LK	537	9-4	-A5
VALIDATOR:	20c	LAB: LAS			DATE:			
CASE:			SDG:	LK	5379			
		ANALYSES	PERFOR!	MED				
Alpha/Beta	Strontium-80	☐ Technetium-99	☐ Alpha Spectross	ору	Gamma Spectrosco			
Total Uranium	☐ Radium-22	X Tritium	a					
1. Completen Technical ver Comments:	ification for	rms present? .				Yes	[	N/A ⊏ N/A
Instruments/d		ibrated within				· · · ·		N/A
Initial calib	ration accep	table?				. Yes	No	N/A
Standards NIS	T traceable?	• • • • • •				. Yes	No	N/A
Standards Exp	oired?	• • • • • •				. Yes	No.	N/A
				<del></del>			<u>-</u> -	
				<del></del>	<del></del>	<del></del>		

# WHC-SD-EN-SPP-001, Rev. 1

3. Continuing Calibration
Calibration checked within one week of sample analysis? Yes No N/A
Calibration check acceptable? Yes No N/A
Calibration check standards NIST traceable? Yes $NO$ $N/A$
Calibration check standards expired? Yes No N/A
Comments:
4. Blanks
Method blank analyzed?
Method blank results acceptable?
Analytes detected in method blank? Yes (No) N/A
Field blank(s) analyzed? Yes (No) N/A
Field blank results acceptable? Yes No N/A
Analytes detected in field blank(s)? Yes N/A
Transcription/Calculation Errors? Yes No N/A
Comments:
5. Matrix Spikes
Matrix spike analyzed? Yes No N/A
Spike recoveries acceptable?
Spike source traceable? Yes No (N/A
Spike source expired? Yes No N/A
Transcription/Calculation Errors? Yes No N/A
Comments:
•
}

A-2pm

# WHC-SD-EN-SPP-001, Rev. 1

6. Laboratory Control Samples	. □ N/A
LCS analyzed?	No N/A
LCS recoveries acceptable?	No N/A
LCS traceable? Yes	No N/A
Transcription/Calculation Errors? Yes	No (N/A)
Comments:	
7. Chemical Recovery	- Ц N/A
Chemical carrier added? Yes	No N/A
Chemical recovery acceptable?	No N/A
Chemical carrier traceable? Yes	No NA
Chemical carrier expired? Yes	No N/A
Transcription/Calculation errors? Yes	No N/A
Comments: SR-90	
8. Duplicates	. □ N/A
Duplicates Analyzed?	No N/A
RPD Values Acceptable? Yes	No N/A
Transcription/Calculation Errors? Yes	No N/A
Comments:	

# WHC-SD-EN-SPP-001, Rev. 1

9. Field QC Samples
Field duplicate sample(s) analyzed?  Field duplicate RPD values acceptable?  Field split sample(s) analyzed?  Field split RPD values acceptable?  Performance audit sample(s) analyzed?  Performance audit sample results acceptable?  Yes No N/A  Performance audit sample results acceptable?  Yes No N/A  Comments: Gross Bets RPD (3190)  Ac-228, Ph-212, Dh-214, Rs-226, Rv106 + U-235 was not analyzed by QES
10. Holding Times  Are sample holding times acceptable? Yes No N/A  Comments:
11. Results and Detection Limits (Levels D & E)
Results supported in raw data? Yes No $N/A$ Results Acceptable? Yes No $N/A$ Transcription/Calculation errors? Yes No $N/A$ MDA's meet required detection limits? Yes No $N/A$ Transcription/calculation errors? Yes No $N/A$
Comments: Ra-228, E60-152, EU-155, Fc-59, RA-224 RU-104, U234 MDA ) CRDL  ACMEN

DEC 1995
RECEIVED Validation

### 19 December 1995

Ms. Joan Kessner Bechtel Hanford Incorporated Post Office Box 969 MSIN H4-23 Richland, Washington 99352

Dear Ms. Kessner:

Enclosed is the 100-NR-2 Groundwater Sampling Round 8 Summary Report.

Sincerely,

R. Bruce Christian Consultant

cc:

J. Duncan - CH2

R. Stringer - ATK

J. Goode - ATK

C. Reyes - ATK

# Validation Reports 100-NR-2

# DATA VALIDATION SUMMARY REPORT FOR THE 100-NR-2 OPERABLE UNIT GROUNDWATER SAMPLING ROUND 8

Submitted To:

P.O. Box 1970 2355 Stevens Drive Richland, WA 99352

Submitted By:

A.T. Kearney, Inc. 2952 George Washington Way Richland, WA 99352

In Response To:

Purchase Order VSR-B95-015 Task Order No. SAF-B95-093

Document Control Number BHI-00555, Rev. 00

Validation Start Date: 8 November 1995 Validation Completion Date: 8 December 1995

19 December 1995

# **DISCLAIMER**

This report is designated as Revision 0. The report addresses the validation of the 100-NR-2 Operable Unit Groundwater Sampling Round 8 data. The report addresses only those samples that have been provided for data validation review.

All related quality assurance samples, including all field quality control samples, were reviewed and validated to verify that reported sample results were of sufficient quality to meet quality control objectives specified by Bechtel Hanford, Inc.

#### **ACRONYMS**

%D Percent difference AA Atomic absorption **BFB** Bromofluorobenzene BNA Base/neutral and acid

CCB Continuing calibration blank

CV Coefficient of variation

CCV Continuing calibration verification CLP Contract laboratory program

CRA CRDL standard for AA

CRDL Contract Required Detection Limit

CRI CRDL standard for ICP

CRII CRDL standard for ICP initial CRIF CRDL standard for ICP final

CRQL Contract required quantitation limit

CVAA Cold vapor atomic absorption

DBC Dibutylchlorendate

**DFTPP** Decafluorotriphenylphosphine

DQO Data quality objectives

EPA U.S. Environmental Protection Agency GC/MS Gas chromatography/mass spectrometry

GC Gas chromatography

GFAA Graphite furnace atomic absorption **GPC** Gel permeation chromatography

ICB Initial calibration blank

ICP Inductively coupled plasma emission spectrometry

ICP interference check sample ICS ICV Initial calibration verification IDL Instrument detection limit LCS Laboratory control sample LCSS Laboratory control sample soil Laboratory control sample water LCSW MDA Minimum detectable activity MSA Method of standard addition

MS/MSD Matrix spike/matrix spike duplicate

PBW Preparation blank water PCB Polychlorinated biphenyl

PEM Performance evaluation mixture

QA Quality assurance Quality control QC

RDL Required detection limit

RF Response factor

RIC Reconstructed ion chromatogram

**RPD** Relative percent difference

BHI-00555 Rev. 00

RRF Relative response factor
RRT Relative retention time
RSD Relative standard deviation
RT Retention time
SDG Sample delivery group
SOW Statement of work
TAL Target analyte list

TCL Target compound list
TIC Tentatively identified compounds

TOC Total organic carbon
TOX Total organic halogen

V Validated

VOC Volatile organic compounds

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Append	dix B - Metals Validated Laboratory Report Forms
Append	dix C - General Chemistry Data Summary Tables
Append	dix D - General Chemistry Laboratory Report Forms
Append	dix E - Radiochemistry Summary Tables
Append	dix F - Radiochemistry Validated Laboratory Report Forms

# 1.0 INTRODUCTION

The information provided in this validation summary report includes data from the chemical analyses of samples from the 100-NR-2 Operable Unit Round 8 Groundwater Sampling Investigation. Data from this sampling event and their related quality assurance samples were reviewed and validated in accordance with WHC guidelines at the requested level.

Sample analyses included metals, general chemistry and radiochemistry. Forty-eight (48) metals samples were analyzed by Quanterra Environmental Services (QES) and Lockheed Analytical Services (LAS). The metals samples were validated using Westinghouse-Hanford protocols specified in *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2. All metals data were qualified based on this guidance. The container for sample number BOGJW7 in SDG No. W0721-QES was broken in transit and therefore no results were available for validation. The table below lists the metals SDGs that were validated for this sampling event.

SDG No.	Matrix	No. of Samples Analyzed	Level of Validation	Parameters
W0690	W	12	Α	Metals
W0699	w	20	С	Metals
W0721	w	14	С	Metals
LK5379	W	2	С	Metals

Fifty (50) samples were analyzed for general chemistry parameters by QES and LAS laboratories. General chemistry sample analyses included the following parameters:

- Chloride
- Fluoride
- Nitrate
- Nitrite
- Orthophosphate
- Turbidity
- Specific Conductance
- pH
- Total Petroleum Hydrocarbons
- Oil and Grease

The general chemistry samples were validated using the Westinghouse Hanford protocols specified in *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2. All general chemistry data were qualified based on this guidance. The table below lists the general chemistry SDGs that were validated for this sampling event.

SDG No.	Matrix	No. of Samples Analyzed	Level of Validation	Parameters
W0690	w	13	Α	General Chem
W0699	w	20	С	General Chem
W0721	w	15	С	General Chem
LK5379	w	2	С	General Chem

Twenty-nine (29) samples were analyzed for radiochemical parameters by QES and LAS laboratories. Radiochemistry sample analyses included the following parameters:

- Gross alpha and gross beta determination
- Strontium-90
- Gamma Spectroscopy
- Tritium

The radiochemical samples were validated using the Westinghouse-Hanford protocols specified in *Data Validation Procedures for Radiochemical Analyses*, WHC-SD-EN-SPP-001, Rev. 1. All radiochemical samples were qualified based on this guidance. The table below lists the radiochemistry SDGs that were validated for this sampling event.

SDG No.	Matrix	No. of Samples Analyzed	Level of Validation	Parameters
W0690	w	8	Α	Radiochemistry
W0699	w	10	С	Radiochemistry
W0721	w	10	С	Radiochemistry
LK5379	w	1	С	Radiochemistry

## **Quality Control Samples**

Included with the samples within this report are the following QC samples: Split samples, field duplicate samples, trip blanks and equipment blanks.

## Split Samples

A field split sample is used to assess precision. A field split sample is a duplicate of a representative sample(s) from a sampling event that is sent to a third party (reference) laboratory for analysis. Two sets of split samples were submitted to the QES and LAS laboratories as shown below:

Sample No.	Split Sample No.	Well Location	
BOGJS8(QES)	BOGJY4(LAS)	199-N-21	
BOGJS9(QES)	BOGJY5(LAS)	199-N-21	

The results for the split samples were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All radiochemistry results fell within the required control limits with the exception of:

Gross beta in SDG No. LK5379-LAS (sample pair B0GJS8/B0GJY4).

All general chemistry and metal results fell within the required control limits.

No qualifiers were assigned based on the split sample results, since under WHC validation guidelines, sample data are not qualified based on split samples results. All results for both well locations appear in the summary tables within this report.

# Field Duplicates

A field duplicate sample is a sample that is split and submitted to a given laboratory as two discrete field samples without the laboratory knowing the duplicate identity. Three sets of field duplicate samples were submitted to the QES laboratory as shown below:

## Set 1:

Sample No.	Duplicate Sample No.	Well Location
B0GJV0	B0GJX8	199-N-54
B0GJV1	B0GJX9	199-N-54

#### Set 2:

Sample No.	<u>Duplicate Sample No.</u>	Well Location
BOGJV6 BOGJV7	BOGJYO BOFJY1	199-N-70 199-N-70
Set 3:		
Sample No.	Duplicate Sample No.	.Well_Location

BOGJV8 BOGJY2 199-N-75 BOGJV9 BOGJY3 199-N-75

The field duplicate results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All metals, general chemistry, and radiochemistry results fell within the required control limits.

No qualifiers were assigned based on the duplicate sample results, since under WHC guidelines, sample data are not qualified based on field duplicate results. All results for both well locations appear in the summary tables within this report.

# **Equipment Blanks**

Equipment blanks are water samples used to determine whether or not decontamination procedures were adequate or that contamination was not inherent in the equipment used. Four equipment blanks were submitted to the QES laboratory as follows:

 Samples B0GJW6, B0GJW7 (sample container destroyed), B0GJW8 and B0GJX0.

The following metal analytes were detected in the equipment blanks:

- Barium, calcium, iron, magnesium, manganese, sodium and zinc in sample BOGJW6.
- Barium, beryllium, calcium, copper, iron, magnesium, manganese, sodium, vanadium and zinc in sample BOGJW8.
- Barium, calcium, iron, magnesium, manganese, sodium, vanadium, and zinc in sample BOGJX0.

The following general chemistry analytes were detected in the equipment blanks:

- Turbidity in samples BOGJW6, BOGJW8, and BOGJX0.
- Oil and Grease in samples BOGJW8 and BOGJX0.

The following radiochemical analytes were detected in the equipment blanks:

Gross beta in sample BOGJW6.

No qualifiers were assigned since under WHC validation guidelines, sample data are not qualified based on field blank results.

### Trip Blanks

Trip blanks are deionized water samples used to measure contamination during sample transport. Trip blanks travel with sample containers to the sampling site and return unopened to the laboratory with the samples to be analyzed. Five trip blanks were submitted to QES as follows:

Samples BOGJX2, BOGJX3, BOGJX4, BOGJX5, and BOGJX6.

The following metal analytes were detected in the trip blanks:

- Barium, calcium, chromium, iron, magnesium, manganese, sodium, vanadium and zinc in sample BOGJX2.
- Barium, calcium, iron, magnesium, manganese, sodium and zinc in sample BOGJX3.
- Barium, beryllium, calcium, copper, iron, magnesium, manganese, potassium, silver, sodium, vanadium and zinc in sample BOGJX4.
- Barium, beryllium, calcium, copper, iron, magnesium, manganese, potassium, sodium, vanadium and zinc in sample BOGJX5.
- Barium, beryllium, calcium, copper, iron, magnesium, manganese, sodium, vanadium, and zinc in sample BOGJX6.

The following wet chemistry analytes were detected in the trip blanks:

- Nitrate, oil and grease, and turbidity in sample BOGJX4.
- Nitrate in sample BOGJX5.

Turbidity and oil and grease in sample BOGJX6.

No detects were reported for trip blanks analyzed for radiochemical parameters.

No qualifiers were assigned since under WHC validation guidelines, sample data are not qualified based on field blank results.

The following report is broken down into sections for metals, general chemistry and radiochemical analyses. Each metals section includes:

- A general validation summary which addresses precision, accuracy, representativeness, completeness, and comparability;
- Holding times;
- Calibrations:
- Blanks, including calibration, and preparation blanks;
- Analytical accuracy including matrix spike samples, laboratory control samples, GFAA analytical spikes and MSA results;
- Analytical precision including laboratory duplicates, ICP serial dilutions, field duplicates, field splits, and GFAA duplicate injections;
- Sample result quantitation, verification and reported detection limits;
   and
- System performance and overall assessment.

# Each general chemistry section includes:

- A general validation summary which addresses precision, accuracy, representativeness, completeness, and comparability;
- Holding times;
- Calibrations;
- Blanks, including calibration and preparation blanks;
- Analytical accuracy including matrix spike samples and laboratory control samples;
- Analytical precision including laboratory duplicates, field duplicates and field splits;
- Sample result quantitation, verification and reported detection limits;
   and
- System performance and overall assessment.

# Each radiochemistry section includes:

- A general validation summary which addresses precision, accuracy, representativeness, completeness, and comparability;
- Holding times;
- Calibrations;
- Blanks, including laboratory and method blanks;

- Analytical accuracy including chemical recoveries, matrix spike samples and laboratory control samples;
- Analytical precision including laboratory duplicates, field duplicates and field splits;
- Sample result quantitation, verification and reported detection limits;
   and
- System performance and overall assessment.

In addition, the appendices include the data summary tables as well as the validated laboratory report forms for metals, general chemistry and radiochemistry analyses.

Data validation personnel added qualifiers to the reported data based on specified data quality objectives. Qualifiers which may be applied by data validators in compliance with WHC guidelines are as follows:

- U Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

- NJ Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

## 1.1 OBJECTIVES AND SCOPE

Data validation is performed in order to determine the usability of analytical results to support programmatic decisions regarding the selection of cleanup remedies and investigative approach. Data validation is the process of reviewing a body of analytical data to determine if it meets the criteria defined in the WHC validation guidelines, and to assure that the data are acceptable for their intended use. The validation process consists of:

- Verifying the data packages for completeness using validation Level
   A;
- Verifying compliance with quality assurance (QA) requirements;
- Checking quality control (QC) values against the defined limits; and
- Applying qualifiers to analytical results for the purpose of defining the limitations of the reviewed data;

The result of data validation is the completion of narrative reports, checklists, and summary forms. The validation will be used to determine whether the analytical data are acceptable for their intended use.

The objectives of this data validation project is to provide Bechtel Hanford Inc. with reliable environmental data regarding the 100-NR-2 Operable Unit Round 8 Groundwater Sampling Investigation.

#### 1.2 SAMPLES AND ANALYSES

SAMPLES AND ANALYSES						
Data Package No.	Sample Number	Sample Location	Sample Date	Sample Type <sup>2</sup>	Level of Validation	Analysis <sup>1</sup>
W0690-QES	BOGHX9	199-N-73	08/28/95	GW	А	1,2,3
W0690-QES	BOGHX8	199-N-71	08/28/95	GW	А	1,2,3
W0690-QES	BOGHY0	199-N-74	08/28/95	GW	А	1,2,3
W0690-QES	BOGJS1	199-N-16	09/06/95	GW	А	1,2,3
W0690-QES	BOGJS2	199-N-16	09/06/95	GW	А	1,2

	SAMPLES AND ANALYSES						
Data Package No.	Sample Number	Sample Location	Sample Date	Sample Type <sup>2</sup>	Level of Validation	Analysis <sup>1</sup>	
W0690-QES	BOGJS6	199-N-19	09/06/95	GW	Α	2	
W0690-QES	BOGHX6	199-N-67	09/07/95	GW	Α	1,2,3	
W0690-QES	BOGJT4	199-N-32	09/07/95	GW	Α	1,2,3	
W0690-QES	BOGJT6	199-N-50	09/07/95	GW	Α	1,2,3	
W0690-QES	BOGJT8	199-N-51	09/07/95	GW	Α	1,2,3	
W0690-QES	BOGJT9	199-N-51	09/07/95	GW	Α	1,2	
W0690-QES	BOGJT7	199-N-50	09/07/95	GW	Α	1,2	
W0690-QES	BOGJT5	199-N-32	09/07/95	GW	A	1,2	
W0699-QES	BOGJS8	199-N-21	09/14/95	GW	C	1,2,3	
W0699-QES	BOGJS9	199-N-21	09/14/95	GW	С	1,2	
W0699-QES	BOGJTO	199-N-25	09/05/95	GW	С	1,2,3	
W0699-QES	B0GJT1	199-N-25	09/05/95	GW	С	1,2	
W0699-QES	BOGJT2	199-N-26	09/05/95	GW	С	1,2,3	
W0699-QES	BOGJT3	199-N-26	09/05/95	GW	С	1,2	
W0699-QES	B0GJV0	199-N-54	09/13/95	GW	С	1,2,3	
W0699-QES	B0GJV1	199-N-54	09/13/95	GW	С	1,2	
W0699-QES	B0GJV8	199-N-75	09/12/95	GW	С	1,2,3	
W0699-QES	B0GJV9	199-N-75	09/12/95	GW	С	1,2	
W0699-QES	BOGJWO	199-N-76	09/05/95	GW	C.	1,2,3	
W0699-QES	B0GJW1	199-N-76	09/05/95	GW	С	1,2	
W0699-QES	B0GJW4	199-N-80	09/11/95	GW	С	1,2,3	
W0699-QES	B0GJW5	199-N-80	09/11/95	GW	С	1,2	

SAMPLES AND ANALYSES							
Data Package No.	Sample Number	Sample Location	Sample Date	Sample Type <sup>2</sup>	Level of Validation	Analysis <sup>1</sup>	
W0699-QES	B0GJX4	199-N-54	09/13/95	GW,TB	С	1,2,3	
W0699-QES	B0GJX5	199-N-54	09/13/95	GW,TB	С	1,2	
W0699-QES	B0GJX8	199-N-54	09/13/95	GW,DUP	С	1,2,3	
W0699-QES	B0GJX9	199-N-54	09/13/95	GW,DUP	С	1,2	
W0699-QES	B0GJY2	199-N-75	09/12/95	GW,DUP	С	1,2,3	
W0699-QES	B0GJY3	199-N-75	09/12/95	GW,DUP	С	1,2	
W0721-QES	BOGJS7	199-N-20	09/20/95	GW	С	2	
W0721-QES	BOGHX7	199-N-3	09/15/95	GW	С	1,2,3	
W0721-QES	B0GJV2	199-N-64	09/20/95	GW	С	1,2,3	
W0721-QES	BOGJV6	199-N-70	09/18/95	GW	С	1,2,3	
W0721-QES	B0GJV7	199-N-70	09/18/95	GW	С	1,2	
W0721-QES	BOFJW2	199-N-77	09/15/95	GW	С	1,2,3	
W0721-QES	B0GJW3	199-N-77	09/15/95	GW,	C	1,2	
W0721-QES	BOGJW6		09/15/95	GW,EB	С	1,2,3	
W0721-QES	B0GJW8	199-N-64	09/20/95	GW,EB	С	1,2,3	
W0721-QES	BOGJX0	199-N-20	09/20/95	GW,EB	С	1,2,3	
W0721-QES	B0GJX2		09/15/95	GW,TB	С	1,2,3	
W0721-QES	B0GJX3		09/15/95	GW,TB	С	1,2	
W0721-QES	B0GJX6	199-N-64	09/20/95	GW,TB	С	1,2,3	
W0721-QES	BOGJY0	199-N-70	09/18/95	GW,DUP	С	1,2,3	
W0721-QES	B0GJY1	199-N-70	09/18/95	GW,DUP	С	1,2	

SAMPLES AND ANALYSES							
Data Package No.	Sample Number	Sample Location	Sample Date	Sample Type <sup>2</sup>	Level of Validation	Analysis <sup>1</sup>	
LK5379-LAS	BOGJY4	199-N-21	09/14/95	GW, SPLIT	С	1,2,3	
LK5379-LAS	B0GJY5	199-N-21	09/14/95	GW, SPLIT	С	1,2	

 <sup>1 =</sup> Inorganics, 2 = General Chemistry, 3 = Radiochemistry
 2 GW = Ground Water EB = Equipment Blank DUP = Duplicate TB = Trip Blank SPLIT = Split Sample

## 2.0 METALS DATA VALIDATION SUMMARY

#### 2.1 SUMMARY

Positive preparation blank contamination was detected in numerous samples. Two samples were not preserved as required by the analytical method. All associated results for the two samples were flagged accordingly.

With the exceptions noted above, the project-specific data quality objectives in terms of precision, accuracy, completeness, representativeness, and comparability have been met.

#### 2.2 HOLDING TIMES

Analytical holding times for ICP metals analyses were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Samples must be analyzed within six months for all metals.

Sample number BOGJX8 in SDG No. W0699-QES and sample number BOGJX2 in SDG No. W0721-QES were not preserved as required in WHC protocols and the analytical method. Therefore, based on professional judgement and the requirements in the <u>USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review</u>, all results for these sample have been qualified as estimates and flagged "J/UJ".

Holding times were met for all samples.

#### 2.3 CALIBRATIONS

Performance of specific instrument quality assurance and quality control procedures, including deficiencies noted during the quality assurance review, are outlined below.

The calibrations are each immediately verified with an ICV standard and a calibration blank. The ICV is prepared from a source independent of the calibration standards, at a mid-calibration range concentration. The ICV percent recovery must fall within the control limits of 90% to 110% for metals analyzed by ICP. Calibration linearity near the detection limit is verified with a standard prepared at a concentration near the CRDL.

The calibrations are subsequently verified at regular intervals using a CCV standard. The control windows for percent recovery of CCV standards are the same as the ICV windows described above.

Calibrations are not reviewed under Level C validation.

#### 2.3.1 ICP Calibration

An ICS is analyzed at the beginning and end of each ICP sample run to verify the laboratory interelement and background correction factors. Results for the ICS solution must fall within the control limit of  $\pm 20\%$  of the true value.

ICP calibration is not reviewed under Level C validation.

## 2.3.2 Atomic Absorption Calibrations

Duplicate injections are required for all GFAA analyses. The duplicate injections establish the precision of the individual analytical determinations. For sample concentrations greater than the CRDL, duplicate injections must agree within plus or minus 20% RSD or CV.

Duplicate injections are not reviewed under Level C validation.

#### 2.4 BLANKS

#### 2.4.1 Calibration Blanks

A calibration blank must be analyzed at each wavelength used for analysis immediately after every initial and continuing calibration verification, at a frequency of 10% or every two hours during the run. The blank must be analyzed at the beginning of the run and after the last analytical sample. A CCB must be run after the last CCV following the last analytical sample of the run. In the case of positive blank results, samples with results (in ug/L) of less than five times the highest amount found in any of the associated blanks have had their associated values qualified as non-detected and flagged "U". Samples with concentrations greater than five times the highest blank value do not require qualification.

If the absolute value of any negative calibration blank exceeds the IDL, all non-detects are qualified as estimates and flagged "UJ". All associated positive results within two times the absolute blank value are qualified as estimates and flagged "J". The qualification applies only to results generated between the associated calibration blank and the nearest acceptable calibration blank.

Calibration results are not reviewed under Level C validation.

### 2.4.2 Preparation Blanks

At least one preparation blank, consisting of deionized distilled water must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with results (in ug/L) of less than 5 times the preparation blank value have their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

If the absolute value of the negative preparation blank exceeds the CRDL, all associated undetected results are rejected and flagged "UR". All associated detects that are less than ten times the absolute value of the preparation blank result are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary. If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all associated non-detected sample results are qualified as estimates and flagged "UJ". All associated detects less than ten times the absolute value of the preparation blank are qualified as estimates and flagged "J".

Due to the presence of a positive preparation blank result, aluminum results in SDG No. W0699-QES sample numbers B0GJS9, B0GJT2 and B0GJX8 have been flagged "U".

Due to the presence of a positive preparation blank result, beryllium results in SDG No. W0699-QES sample numbers BOGJS8, BOGJS9, BOGJT0, BOGJT1, BOGJT2, BOGJV0, BOGJV1, BOGJV8, BOGJV9, BOGJW1, BOGJW4, BOGJW5, BOGJX8, BOGJX9, BOGJY2 and BOGJY3 have been flagged "U".

Due to the presence of a positive preparation blank result, copper results in SDG No. W0699-QES sample numbers B0GJS8, B0GJS9, B0GJT0, B0GJT2, B0GJV0, B0GJV1, B0GJV8, B0GJV9, B0GJW0, B0GJW1, B0GJW4, B0GJW5, B0GJX8, B0GJX9, B0GJY2 and B0GJY3 have been flagged "U".

Due to the presence of a positive preparation blank result, iron results in SDG No. W0699-QES sample numbers BOGJS8, BOGJS9, BOGJT0, BOGJT1, BOGJT3, BOGJV0, BOGJV1, BOGJV8, BOGJV9, BOGJW0, BOGJW1, BOGJW4, BOGJW5, BOGJX8, BOGJX9, BOGJY2 and BOGJY3 have been flagged "U".

Due to the presence of a positive preparation blank result, manganese results in SDG No. W0699-QES sample numbers B0GJS9, B0GJV0, B0GJV8, B0GJV9, B0GJW0, B0GJW1, B0GJW4, B0GJW5, B0GJY2 and B0GJY3 have been flagged "U".

Due to the presence of a positive preparation blank result, all vanadium results in SDG No. W0699-QES in all samples except B0GJX4 and B0GJX5 have been flagged "U".

Due to the presence of a positive preparation blank result, all zinc results in all samples in SDG No. W0699-QES except B0GJX4 and B0GJX5 have been flagged "U".

Due to the presence of a positive preparation blank result, the aluminum result for SDG No. W0721-QES sample number BOGHX7 has been flagged "U".

Due to the presence of a positive preparation blank result, the beryllium results for SDG No. W0721-QES sample numbers B0GHX7, B0GJV2, and B0GJW2 have been flagged "U".

Due to the presence of a positive preparation blank result, the iron results for SDG No. W0721-QES, sample numbers B0GJV6, B0GJV7, B0GJW2, B0GJW3, B0GJY0 and B0GJY1, have been flagged "U".

Due to the presence of a positive preparation blank result, the zinc results for SDG No. W0721-QES sample numbers B0GJV7, B0GJW2, B0GJY0 and B0GJY1 have been flagged "U".

To avoid masking potential sources of contamination, professional judgement was used to determine that for SDG Nos. W0699-QES and W0721-QES, the trip blank and equipment blank results would not be qualified based on method blank results.

Due to the presence of a positive preparation blank result, the zinc result in SDG No. LK5379-LAS sample number BOGJY4 has been flagged "U".

All other preparation blank results were acceptable.

## 2.5 ACCURACY

### 2.5.1 Matrix Spike Samples

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75% to 125%. Samples with a spike recovery of less than 30% and a sample value below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 75% and a sample result

greater than the IDL are qualified "J". All samples with a spike recovery greater than 125% and a sample result less than the IDL require no qualification.

All matrix spike recovery results were acceptable.

# 2.5.2 Laboratory Control Samples

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be digested or distilled and analyzed with every group of samples which have been prepared together. Non-detected sample results with a LCS recovery between 50% and 79% are qualified as estimates and flagged "UJ". Detected sample results with a LCS recovery between 50% to 79% or greater than 120% are qualified as estimates and flagged "J". Associated sample results with a LCS recovery less than 50% are rejected and flagged "R".

LCS results are not considered under Level C validation.

# 2.5.3 GFAA Analytical Spikes

The post-digestion analytical spike is analyzed to determine the extent of interference in the sample matrix. The analytical spike recoveries establish the accuracy of the individual GFAA determinations.

Positive sample results whose analytical spike results are outside the 85% to 115% control limit, but whose absorbances are less than 50% of the analytical spike absorbance, are qualified as estimates and flagged "J". In cases where the analytical spike recovery was less than 10 percent, all non-detects are rejected and flagged "UR".

GFAA analytical spike results are not reviewed under Level C validation

### 2.5.4 Method of Standard Addition (MSA) Results

For all samples whose analytical spike results are outside the 85% to 115% control limit and whose absorbances are greater than 50% of the analytical spike absorbance, an MSA is required. In cases where the MSA correlation coefficient was less than 0.995, the MSA analysis is repeated once. If the correlation coefficient was still less than 0.995, samples are qualified as estimates and flagged "J". If a sample required MSA analysis but was not analyzed, all associated data must be qualified as estimates and flagged "J".

MSA results are not reviewed under Level C validation.

### 2.6 ANALYTICAL PRECISION

# 2.6.1 Laboratory Duplicate Samples

The laboratory duplicate results are used to assess the precision of the method by measuring a second aliquot of the sample that is treated the same way as the original. If the RPD of the original sample and its duplicate is greater than 35% and the positive sample result is greater than five times the CRDL, the associated sample result is qualified as an estimate and flagged "J". Also, if the difference between the duplicate samples is greater than plus or minus the CRDL and the positive sample result is less than five times the CRDL, the associated sample result is qualified as an estimate and flagged "J".

All laboratory duplicate results were acceptable.

#### 2.6.2 ICP Serial Dilution

The ICP serial dilution is used to determine whether significant physical or chemical interferences exist due to sample matrix. If a sample concentration is less than or equal to fifty times the IDL for an analyte and the %D is outside the plus or minus 10% control limits the associated data are qualified as estimates and flagged "J".

Serial dilution results are not reviewed under Level C validation.

### 2.6.3 Field Duplicates

Field duplicate results are compared using the same guidelines for determining the RPD between a sample and its duplicate. According to WHC validation guidelines, no qualifiers are assigned based on field duplicate results. Field duplicate results are discussed in section 1.0 of this report.

# 2.6.4 Field Split Samples

A field split sample is a representative sample from a sampling event that is sent to a third party laboratory. The field split sample results are evaluated by comparing the corresponding sample results to the reference laboratory sample results. According to WHC validation guidelines, no qualifiers are assigned based on field split results. Field duplicate results are discussed in section 1.0 of this report.

## 2.6.5 GFAA Duplicate Injections

Each GFAA analysis requires a minimum of two injections (burns), except for full MSAs. The RSD for the duplicate injections must be within the control limits of plus or minus 20% for samples with concentrations greater than the CRQL. If these requirements are not met, the analytical sample must be rerun once (i.e., two additional burns). If the readings are then still outside the QC limits, the result is qualified as an estimate and flagged "J".

GFAA duplicate injections are not reviewed under Level C validation.

### 2.7 SAMPLE DETECTION LIMITS

The objective of reviewing detection limits is to verify that reported detection limits are less than or equal to the CRDL. All sample results and reported detection limits were acceptable.

## 2.8 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Positive preparation blank contamination was detected in numerous samples. Associated sample results were flagged accordingly. Two samples were not preserved as required by the analytical method and WHC guidelines and were qualified as estimates and flagged "J/UJ". Data flagged "J" indicates that the associated concentration is an estimate, but per WHC guidelines, the data are usable for decision making purposes. All other validated results are considered accurate within the standard error associated with the methods.

All metals data packages submitted for validation were found to be 100% complete.

#### 3.0 GENERAL CHEMISTRY DATA VALIDATION SUMMARY

#### 3.1 SUMMARY

Holding times were exceeded for pH, turbidity, nitrate, nitrite, and phosphate in all samples in all SDGs. All associated positive sample results were qualified as estimates and flagged "J" and all non-detects rejected and flagged "UR". Samples submitted for TPH analysis in SDG Nos. W0690-QES, W0699-QES and W0721-QES and oil and grease analysis in SDG No. LK5379-LAS were not preserved as called for in the analytical method and WHC guidelines and were, therefore, rejected and flagged "R/UR".

With the above noted exceptions, the project-specific data quality objectives in terms of precision, accuracy, completeness, representativeness, and comparability have been met.

#### 3.2 HOLDING TIMES

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: 28 days for fluoride, chloride, sulfate, specific conductivity and oil and grease; 14 days for total petroleum hydrocarbons; 48 hours for turbidity, nitrate, nitrite and phosphate and immediately for pH.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detected sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

The holding time for nitrate was exceeded by less than two times the limit for SDG No. W0690-QES samples BOGHX8, BOGHX9 and BOGHY0 and by greater than twice the limit for sample numbers BOGHX6, BOGJS1, BOGJS2, BOGJT4, BOGJT5, BOGJT6, BOGJT7, BOGJT8, and BOGJT9. All associated results were detects and were, therefore, qualified as estimates and flagged "J".

The holding time for nitrite was exceeded by less than two times the limit for SDG No. W0690-QES samples BOGHX8, BOGHX9 and BOGHY0. All associated results were non-detects, and were therefore flagged "UJ". The holding time for nitrite was exceeded by greater than twice the limit for sample numbers BOGHX6, BOGJS1, BOGJS2, BOGJT4, BOGJT5, BOGJT6, BOGJT7, BOGJT8, and BOGJT9. All associated results were non-detects and were, therefore, rejected and flagged "UR".

The holding time for orthophosphate was exceeded by less than two times the limit for SDG No. W0690-QES samples B0GHX8, B0GHX9 and B0GHY0. All associated results were non-detects and, therefore, flagged "UJ". The holding time for orthophosphate was exceeded by greater than twice the limit for sample numbers B0GJS1, B0GJS2, B0GHX6, B0GJT4, B0GJT5, B0GJT6, B0GJT7, B0GJT8, and B0GJT9. All associated results were non-detects and were, therefore, rejected and flagged "UR".

The holding time for pH was exceeded by less than two times the limit for SDG No. W0690-QES samples B0GJS1, B0GJT4, B0GJT6 and B0GJT8. All associated results were detects and were, therefore, flagged "J".

The holding time for turbidity was exceeded by greater than two times the limit for SDG No. W0690-QES samples BOGHX6, BOGHX8, BOGHX9, BOGJS1, BOGJT4, BOGJT6, BOGJT8 and BOGHY0. All associated results were detects and were, therefore, flagged "J".

The holding time for nitrate was exceeded by less than two times the limit for SDG No. W0699-QES samples BOGJW4 and BOGJW5 and by greater than twice the limit for sample numbers BOGJS8, BOGJS9, BOGJT0, BOGJT1, BOGJT2, BOGJT3, BOGJV0, BOGJV1, BOGJV8, BOGJV9, BOGJW0, BOGJW1, BOGJX4, BOGJX5, BOGJX8, BOGJX9, BOGJY2 and BOGJY3. All associated results were detects and were, therefore, qualified as estimates and flagged "J".

The holding time for nitrite was exceeded by greater than twice the limit for SDG No. W0699-QES sample numbers BOGJS8, BOGJS9, BOGJT0, BOGJT1, BOGJT2, BOGJT3, BOGJV0, BOGJV1, BOGJV8, BOGJV9, BOGJW0, BOGJW1, BOGJX4, BOGJX5, BOGJX8, BOGJX9, BOGJY2 and BOGJY3. All associated results were non-detected and were, therefore, rejected and flagged "UR".

The holding time for nitrite was exceeded, but not by greater than twice the limit, for SDG No. W0699-QES sample numbers B0GJW4 and B0GJW5. Therefore, the associated results, both non-detects, were qualified as estimates and flagged "UJ".

The holding time for orthophosphate was exceeded by greater than twice the limit for SDG No. W0699-QES sample numbers B0GJS8, B0GJS9, B0GJT0, B0GJT1, B0GJT2, B0GJT3, B0GJV0, B0GJV1, B0GJV8, B0GJV9, B0GJW0, B0GJW1, B0GJX4, B0GJX5, B0GJX8, B0GJX9, B0GJY2 and B0GJY3. All associated results were non-detected, and therefore rejected and flagged "UR".

The holding time for orthophosphate was exceeded, but not by greater than twice the limit for SDG No. W0699-QES sample numbers B0GJW4 and B0GJW5. Therefore, the associated results, both non-detects, were qualified as estimates and flagged "UJ".

The holding time for turbidity was exceeded by greater than twice the limit for SDG No. W0699-QES sample numbers B0GJS8, B0GJT0, B0GJT2, B0GJV0, B0GJV8, B0GJW0, B0GJW4, B0GJX4, B0GJX8 and B0GJY2. All associated results were detects and were therefore qualified as estimates and flagged "J".

The holding time for pH was grossly exceeded for SDG No. W0699-QES sample numbers B0GJS8, B0GJT0, B0GJT2, B0GJV0, B0GJV8, B0GJW0, B0GJW4, B0GJX4, B0GJX8 and B0GJY2. Therefore, the associated results were qualified as estimates and flagged "J".

The TPH method requires that water samples be preserved with 5 ml of HCl if analysis will not be performed within several hours of sampling. No preservatives were added to any of the sample aliquots in SDG Nos. W0690-QES, W0699-QES and W0721-QES used for TPH analysis, nor were they analyzed within several hours of sampling. Therefore, since all TPH results were non-detects, all TPH results have been rejected and flagged "UR".

The holding time for nitrate was exceeded by greater than twice the limit in all SDG No. W0721-QES samples analyzed for anions. The associated detected results in samples BOGHX7, BOGJV2, BOGJV6, BOGJV7, BOGJW2, BOGJW3, BOGJY0 and BOGJY1 were qualified as estimates and flagged "J". The associated non-detected results in samples BOGJW6, BOGJW8, BOGJX0, BOGJX2, BOGJX3 and BOGJX6 were rejected and flagged "UR".

The holding time for nitrite was exceeded by greater than twice the limit for SDG No. W0721-QES sample numbers B0GHX7, B0GJV2, B0GJV6, B0GJV7, B0GJW2, B0GJW3, B0GJW6, B0GJW8, B0GJX0, B0GJX2, B0GJX3, B0GJX6, B0GJY0 and B0GJY1. All associated results were non-detects and were therefore rejected and flagged "UR".

The holding time for orthophosphate was exceeded by greater than twice the limit for SDG No. W0721-QES sample numbers B0GHX7, B0GJV2, B0GJV6, B0GJV7, B0GJW2, B0GJW3, B0GJW6, B0GJW8, B0GJX0, B0GJX2, B0GJX3, B0GJX6, B0GJY0 and B0GJY1. All associated results were non-detects and were therefore rejected and flagged "UR".

The holding time for pH was grossly exceeded for SDG No. W0721-QES sample numbers B0GJV2, B0GJV6, B0GJW2, B0GJW6, B0GJW8, B0GJX0, B0GJX2, B0GJX6 and B0GJY0. Therefore, the associated results were qualified as estimates and flagged "J".

The holding time for turbidity was exceeded by greater than twice the limit for SDG No. W0721-QES sample numbers B0GHX7, B0GJV2, B0GJV6, B0GJW6, B0GJW8, B0GJX0, B0GJX2, B0GJX6 and B0GJY0. The associated results were all positive and therefore were qualified as estimates and flagged "J".

The holding time for nitrate was exceeded by greater than twice the limit for SDG No. LK5379-LAS sample numbers BOGJY4 and BOGJY5. Therefore, the associated results, both detects, were qualified as estimates and flagged "J".

The holding time for nitrite was exceeded by greater than twice the limit for SDG No. LK5379-LAS sample numbers BOGJY4 and BOGJY5. Therefore, the associated results, both non-detects, were rejected and flagged "UR".

The holding time for orthophosphate was exceeded by greater than twice the limit for SDG No. LK5379-LAS sample numbers B0GJY4 and B0GJY5. Therefore, the associated results, both non-detects, were rejected and flagged "UR".

The holding time for turbidity was exceeded by greater than twice the limit for SDG No. LK5379-LAS sample number BOGJY4. Therefore, the associated detected result was qualified as an estimate and flagged "J".

The holding time for pH was grossly exceeded for SDG No. LK5379-LAS sample number BOGJY4. Therefore, the associated result was qualified as an estimate and flagged "J".

The Oil and Grease method requires that water samples be preserved with 5 ml of HCl if analysis will not be performed within several hours of sampling. No preservatives were added to the aliquot of SDG No. LK5379-LAS sample BOGJY4 which was used for Oil and Grease analysis, nor was the sample analyzed within several hours of sampling. Therefore, since the Oil and Grease result was non-detected, the result was rejected and flagged "UR".

Holding times for all other analytes met QC requirements.

#### 3.3 CALIBRATIONS

#### 3.3.1 Initial Calibration

The following calibration procedures must be conducted:

- At least one blank and three standards are used to establish the ion chromatography, ion selective electrode, and spectrophotometer calibrations prior to sample analysis with a correlation greater than or equal to 0.995.
- At least two reference buffers or standards at a high and low concentration were used to calibrate the pH and conductivity meters.

If any of these initial calibration requirements are not met, all associated data are qualified "J" for detects and "UJ" for non-detects.

Initial calibration results are not reviewed under Level C validation.

# 3.3.2 Continuing Calibration Verification

All CCV standards must be analyzed within the required frequency or every 20 samples. The percent recoveries must fall within the 90%-110% acceptance windows. If the recoveries fall outside this window, then all associated detects are qualified as estimates and flagged "J" and all non-detects are flagged "UJ".

Continuing calibration results are not considered under Level C validation.

### 3.4 BLANKS

## 3.4.1 Laboratory Blanks

At least one laboratory preparation blank must be analyzed with each sample batch. At least one initial calibration blank must be analyzed for every 20 samples. As per WHC guidelines, no qualification of data based on blank contamination is required.

All laboratory blank results were acceptable.

### 3.5 ACCURACY

### 3.5.1 Matrix Spike Recovery

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75% to 125%. Samples with a spike recovery less than 30% and a sample value below the IDL are rejected and flagged "UR". Samples with a spike recovery between 30% and 74% and a sample value below the IDL are qualified as estimates and flagged "UJ". Samples with a spike recovery of less than 75% or greater than 125% and a sample value greater than the IDL are qualified as "J". Finally, samples with a spike recovery of greater than 125% and a sample value less than the IDL are acceptable and do not require qualification.

All matrix spike recovery results were acceptable.

# 3.5.2 Laboratory Control Sample Recovery

The LCS monitors the overall performance of all steps in the analysis, including the sample preparation. An LCS should be prepared (e.g., digested or distilled) and analyzed with every group of samples which have been prepared together. The performance criteria for aqueous LCS percent recovery is 80% to 120%. The performance criteria for solid LCS samples are established by the manufacturer or the laboratory.

LCS results are not reviewed under Level C validation.

### 3.6 PRECISION

## 3.6.1 Laboratory Duplicates

The laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Laboratory duplicate RPDs must fall below 20% for waters and 35% for soils. If an RPD for an aqueous sample is greater than 20% and the sample result is less than five times the CRDL, all associated detects are qualified as estimates and flagged "J". If the range between duplicate aqueous samples is greater than plus or minus the CRDL and the sample result is less than five times the CRDL, all associated detects are qualified as estimates and flagged "J". If an RPD for soil samples is greater than 35% and the sample result is greater than five times the CRDL, all associated detects are flagged "J". If the range between duplicate soil samples is greater than plus or minus two times the CRDL and the sample result is less than five times the CRDL, then all detects are flagged "J".

All laboratory duplicate results were acceptable.

### 3.6.2 Field Duplicates

Field duplicate sample analyses are used to measure both the lab and field sampling procedure precision. Field duplicate results are compared using the same guidelines for determining the precision between a sample and its duplicate. Under WHC validation guidelines, data are not qualified based on field duplicate results. Results of the field duplicate samples are discussed in section 1.0 of this report.

## 3.6.3 Field Split Samples

A field split sample is a representative sample from a sampling event that is sent to a third party laboratory. Field split sample results are evaluated by comparing the corresponding sample results to the reference laboratory sample

results. Under WHC validation guidelines, data qualification is not required based on field split results. Results of the field split samples are discussed in section 1.0.

### 3.7 SAMPLE DETECTION LIMITS

The sample detection limits were evaluated to ensure that all analytes were analyzed for at or below the CRDL. All sample detection limits were acceptable.

### 3.8 OVERALL ASSESSMENT AND SUMMARY

Holding times for pH, turbidity, nitrate, nitrite, and phosphate were exceeded for all samples in all SDGs. All results were qualified as estimates and flagged "J/UJ" or rejected and flagged "UR". TPH results in SDG Nos. W0690-QES, W0699-QES and W0721-QES were rejected and flagged "UR" due to the lack of a preservative. Oil and grease results in SDG No. LK 5379-LAS were rejected and flagged "UR" due to the lack of a preservative. Data flagged "J" indicates that the associated concentration is an estimate, but under WHC guidelines, the data are considered usable for decision making purposes. Rejected data is not useable and should not be reported. All other validated results are considered accurate within the standard error associated with the methods.

All packages submitted for validation contained data that was rejected and flagged "R/UR", resulting in an overall completeness of 73%.

### 4.0 RADIOCHEMISTRY DATA VALIDATION SUMMARY

### 4.1 SUMMARY

Due to a high LCS percent recovery, sample B0GJV2 in SDG No. W0721-QES was qualified as estimated and flagged "J". Due to the lack of a matrix spike analysis, all tritium results in SDG Nos. W0699-QES and W0721-QES were qualified as estimates and flagged "J/UJ".

With the exceptions noted above, the project-specific data quality objectives in terms of precision, accuracy, completeness, representaiveness, and comparability have been met.

### 4.2 HOLDING TIMES AND SAMPLE PREPARATION

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analyses is six months. Tritium sample preparation requires distillation. Tritium samples must be analyzed within seven days of distillation.

All holding times and sample preparation measures were acceptable.

### 4.3 CALIBRATIONS

Instrument calibration is performed to establish that the counters used to determine radionuclide activities are capable of producing acceptable and reliable analytical data. Each counting system must be factory calibrated at installation and after any maintenance or repair. Calibration consists of an instrument efficiency determination for each applicable radionuclide. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

Calibration results, including efficiency checks and background counts, are not reviewed Level C validation.

### 4.4 LABORATORY BLANKS

Laboratory blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers were applied: All positive sample results less than five times the highest blank concentration are qualified as estimates; sample results below the MDA are

elevated to the MDA and qualified as undetected; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

All laboratory blank results were acceptable.

### 4.5 ACCURACY

### 4.5.1 Laboratory Control and Matrix Spike Samples

Accuracy was evaluated by analyzing soil or distilled water samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70% to 130%, while that for a matrix spike is 60% to 140%. Spike sample results outside the above ranges resulted in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

Due to an LCS recovery of 481 percent, all gross alpha results in SDG No. W0721-QES were qualified as estimates and flagged "J/UJ".

Due to the lack of a matrix spike analysis, all tritium results in SDG Nos. W0699-QES and W0721-QES were qualified as estimates and flagged "J/UJ".

All other laboratory control and matrix spike sample results were acceptable.

### 4.6 PRECISION

### 4.6.1 Laboratory Duplicates

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision is also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 35% for soil samples and less than 20% for water samples, the results are acceptable. If either activities are less than five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If the RPD is outside the applicable control limit, associated results are qualified as estimates and flagged "J/UJ".

All laboratory duplicate results were acceptable.

### 4.6.2 Field Duplicates

Field duplicate results are compared using the same guidelines for determining the RPD between a sample and its duplicate. Under WHC validation guidelines, data qualification is not required based on field duplicate results. Results of the field duplicate samples are discussed in section 1.0.

### 4.6.3 Field Split Samples

A field split sample is a representative sample from a sampling event that is sent to a third party laboratory. The field split sample results are evaluated by comparing the corresponding sample results to the reference laboratory sample results. Under WHC validation guidelines, data qualification is not required based on field split results. Results of the field split samples are discussed in section 1.0.

# 4.7 SAMPLE RESULTS QUANTITATION, VERIFICATION AND REPORTED DETECTION LIMITS

The MDA for each analyte was assessed to ensure that it met the CRDL. The reviewer verified that the reported detection limits were at or below the CRDL.

### 4.8 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Due to a 481 percent LCS recovery, all gross alpha results in SDG No. W0721 were qualified as estimates and flagged "J/UJ". Due to the lack of a matrix spike analysis with SDG Nos. W0699-QES and W0721-QES, all tritium results were qualified as estimates and flagged "J/UJ". Data flagged "J" indicate the associated concentration is an estimate, but under WHC guidelines, the data are considered usable for decision making purposes. All other validated results are considered accurate within the standard error associated with the methods.

All data packages were found to be 100% complete.

### 5.0 REFERENCES

- EPA, 1987, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.
- EPA, 1988a, EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988b, Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988c, EPA Contract Laboratory Program Statement of Work for Inorganics Analyses, Multi-Media, Multi-Concentration, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988d, Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1990, EPA Contract Laboratory Program Statement of Work for Inorganic Analyses, Multi-media, Multi-Concentration, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1991, EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration, Environmental Protection Agency, Washington, D.C.
- WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.
- WHC, 1992b, Data Validation Procedure for Radiological Analyses, WHC-SD-EN-SPP-001, Rev. 2, Westinghouse Hanford Company, 1993.
- EPA, 1994, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, U.S. Environmental Protection Agency, Washington, D.C.

**APPENDICES** 

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# APPENDIX A METALS DATA SUMMARY TABLES

Project: BECHTEL-	-HANFO	RD		]																	
Laboratory: Quante				}																	
Сазе	SDG: W																				
Sample Number		BOGJS8		BOGJS9		водло		BOGJT1		BOGJT2		водлз		B0GJV0		B0GJV1		B0GJV8		BOGJV9	
Location		199-N-	-21	199-N-	21	199-N-	25	199-N-	-25	199-N-	26	199-N-	26	199-N-	54	199-N-	-54	199-N-	- 75	199-N-	-75
Remarks		<u> </u>								<u> </u>											
Sample Date		09/14/95	<u> </u>	09/14/95		09/05/95		09/05/95		09/05/95		09/05/95		09/13/95		09/13/95		09/12/95	5	09/12/95	
Inorganic Analytes	CHDL	Result	Q.	Result	9	Result	<u>C</u>	Result	Ġ.	Result	Q	Result				Result		Result		Result	Q
Aluminum	200	24.6		26.3		24.6		24.6		25.0		24.6		24.6		24.6		24.6		24.6	
Antimony	60	45.9	υ	45.9	<u> </u>	45,9	υ	45.9	U	45.9	ַע	45.9	<u>u</u> _	45.9	U_	45.9	lin-	45.9	U.	45.9	ļυ
Arsenic	10	NA NA	<b>├</b> —	NA NA	<u> </u>	NA NA		NA NA	<u> </u>	NA NA	┡	NA	_	NA NA	<u> </u>	NA NA	↓_	NA	<u> </u>	NA	<u> </u>
Barium	200	30.4		30.5	<del></del> -	43.4		42.6	٠	51.6		51.0		67.4		72.4	_	26.8	نسيا	28.0	<u> </u>
Beryllium	5	0,91		1.4		0.61		0.61		0.62		0.50		0.92		1.3		0,69		0.92	
Cadmium	5	3.1		3.1	Ų.	3.1	שַ	3.1		3.1	<u> </u>	3.1	ט	3.1	U.	3.1		3.1		3.1	
Calcium	5000	73100		75400		29000		28900		43400		42700		124000		135000		30200		30000	
Chromium	10	3,3		2.8		13.1		4.8		26.4		3.2		8.4		2.8		2.8		2.8	
Cobalt	50	4.3		4.3		4.3		4.3		4.3		4.3		4.3		4.3		4.3		4,3	
Copper	25	29.2		37.0		14.2		3.6		17.0	ַט	3,6		30,1		35.5		9.0		23,0	
Iron	100		U	55.6	ע	211	U	175	ַט_	582		101	U	82.2	U_	92.8	U	36.7	U	40,6	U
Lead	3	NA		NA		NA		NA	L_	NA		NA	i	NA		NA		NA		NA	
Magnesium	5000	15600		15900		7990		7870		9400		9320	L	21200		22800	<u> </u>	5280		5300	
Manganese	15	13.2		8.0	U	30,1		33,6		49.5		34.7		7.8	C	10.5		4.6	U	5.3	U
Mercury	0.2	NA		NA		NÄ	Ĺ	NA		NA		NA		NA NA		NA		NA		NA	$\sqcap$
Nickel	40	14.2	Ü	14.2	U	14.2	U	14.2	ַ	16.8		14.2	Ü	14.2	U	15.9		14.2	U	14.2	<u>י</u>
Potassium	5000	8560		9100		4810		4740		6050		5290		6120		4890		2310		2300	
Selenium	5	NA_		NA.		NA		NA		NA		NA		NA		NA NA		NA		NA	$\overline{}$
Silver	10	2.2	U	2.2	U	2,2	U	2.2	כ	2,2	S	2.2	<u>G</u>	2.2	U	9.3		2.2	U	2,2	U
Sodium	5000	131000	П	131000		133000		128000		109000		113000		45900		49200	Γ	3070		3020	
Thallium	10	NA		_NA		NA.		NA_		NA_		NA		NA		NA NA		NA		NA	
Vanadium	50	32.9	U	43.7	Ü	13.7	Ū	20.1	C	24.6	C	19.4	C	28.2	Ü	34.4	U	14.9	Ü	27.2	U
Zinc	20	21.6	υ	21.1	U	28.9	U	24.2	Ų	12.8	U	14.7	U	15.1	Ū	15.7	Ū	36.6		12.2	Ū
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NA = Not Analyzed

Project: BECHTEL	-HANFO	RD	•	]																	
Laboratory: Quante				1																	
Case	SDG: W	0699		1																	
Sample Number		BOGJWO	)	B0GJW1		B0GJW4	}	BOGJW		B0GJX4		B0GJX5		B0GJX8		B0GJX9		B0GJY2	:	B0GJY3	$\overline{}$
Location		199-N-	-76	199-N-	76	199-N-	-80	199-N	-80			199-N-		199-N-	54	199-N-	-54	199-N-	-75	199-N-	-75
Remarks										Trip blar		Trip blan		Duplicate		Duplicat	e	Duplicat	0	Duplicat	e
Sample Date		09/05/95		09/05/95		09/11/95		09/11/95		09/13/95		09/13/95		09/13/95		09/13/95	<u> </u>	09/12/95	5	09/12/95	5
Inorganic Analytes		Result	Q	Result	Q			Result	Q	Result		Result	a	Result	a	Result	Q			Result	Q
Aluminum	200	24.6		24.6		24.6		24.6		24.6		24.6	ᅴ	37.1	บJ	24.6		24.6		24.6	
Antimony	60		<u>lu</u>	45.9	Ų	45,9	U	45.9	U	45,9	ļu	45.9	U	45.9	IJ		U	45,9	U	45.9	U
Arsenic	10		L	NA		NA.	<u></u>	NA.	<u> </u>	NA	<u> </u>	NA		NA		NA		NA NA		NA	
Barium	200	17.9		18.6		31.2	<u> </u>	31,5		5.0		4.2		72.1		74,3		26.3		26.4	
Beryllium	5	0.50		0.69		0.84		0.92		0.92		0.92		1.5				0.68		0.92	
Cadmium	5			3.1	U	3.1	U	3.1		3.1		3.1	U	3.1			U	3,1		3.1	
Calcium	5000	28300		28500		34100		33600		1850		1740		135000		140000	<u> </u>	29400		29200	
Chromium	10	3.1		2.8		199		179		2.8		2.8	U	6.3		2.8		2.8		2.8	V
Cobalt	50	4.3		4.3		4.3		4.3		4.3	U	4.3	U	4.3	UĴ	4.3	U	4.3		4.3	U
Copper	25	13.6	U	5.2		19.7		18.2		21.1		9.0		21.6		31.6		11.6		19.6	U
Iron	100	41.0	U	56.2	U	94.5	U	41.7	Ū	37.5		32.7		103	IJ	90.8	U	30,9	U	39,1	Ü
Lead	3	NA		NA		NA		NA.	Ι	NA	Γ	NA		NA		NA NA		ŇÁ		NA	
Magnesium	5000	4890	$\Box$	5000		16300		15900	Ι	649		640		22900	<u>د</u> ا	23300		5140		5140	
Manganese	15	3.3	U	4.5	U	7.7	U	7.4	U	4.5		4.2		10.3	J	10.4	Ľ	3.7	U	5.1	U
Mercury	0.2	NA		NA		NA		NA.		NA		NA.		NA		NA		NA		NA	
Nickel	40	14.2	U	14.2	U	14.2	כ	14.2		14.2		14.2	U	14.2			U	14,2	U	14.2	
Potassium	5000	2290		2540		4900		5220		1130	<u> </u>	1450		5830	J	6470		2420		2510	
Selenium	5	NA	_	NA		NA		NA		NA		NA.		NA		NA		NA	$\square$	NA	
Silver	10	2.2		2.2	U	2.2	U	2,2		4.1		2.2	U	3,5		2.2	U	2.2	U	2.2	
Sodium	5000	2990		3000		24100		23300		464		449		49300	J	49600	<u></u>	2980	<u> </u>	2960	
Thallium	10	NA		NA		NA	<u></u>	NA		NA		NA		NA		NA		NA	<u> </u>	NA	Ш
Vanadium	50	7.2	<u>ַ</u> ע	16.3		31.1		36.6		21.0		19.6		37.4		42,3		17.3		25.4	
Zinc	20	10.4	<u>ַ</u>	16,1	U	14.5	U	36.3	ln	14.2		13.6		32.8	บป	15.8	U	28.2	U	12.3	Ū
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Project: BECHTEL-		RD		}																	
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Case	SDG: Y			<u></u>																	
Sample Number		BOGHX7		B0GJV2		B0GJV6		B0GJV7		B0GJW2		B0GJW3		B0GJW6		B0GJW8		<b>BOGJXO</b>		B0GJX2	
Location		199-N-	. 3	199-N-	64	199-N-	70	199-N-	70	199-N-	77	199-N-7	7			199-N-6		199-N-	20		
Remarks				<u></u>	_	ļ				<u> </u>		<u> </u>		EB		EB		EB		Trip Blar	
Sample Date		09/15/95		09/20/95		09/18/95		09/18/95		09/15/95		09/15/95		09/15/95		09/20/95		09/20/95		09/15/95	i
Inorganic Analytes					Q	Result	Q.			Result	<u>Q</u>	Result		Result		Result		Result		Result	
Aluminum	200	44.2		632		24.6	<u>U</u>	24.6		24.6		24.6		24.6		24.6		24.6		24.6	
Antimony	60	45.9		45.9	<u>u_</u>	45.9	U	45.9	U	45.9		45.9 L	U	45.9	υ	45.9	<u>U  </u>	45,9	U	45.9	
Barium	200	158		122		35.4		34.8		37.9		37.9		5.2	إحبيا	5.2		5.2		3.1	
Beryllium	5	0.84		1.1		0.51		0.50		0,66		0.50 (		0,50		0.67		0.50			
Cadmium	5	3.1		3.1	U_	3.1	U	3.1	<u>U</u>	3.1		3.1	<u>י</u>	3.1	<u>U</u>	3.1 1	<u>u j</u>	3.1	U		UJ
Calcium	5000	172000		115000		36400		36400		30500		31200		1700		1780		1820		1670	
Chromium	20	9.8		89.8		11.5		10,8		11.2		3.2 1		2.8		2.8		2,8		4.8	
Cobalt	50	4.3		4.3	U	4.3	U	4.3		4.3	U_	4.3		4.3		4.3	<u>u (</u>	4.3			UJ
Copper	25	21.8		30,3		4.7		4.7		4.7		4.7		4.7	U	5.4		4.7	U	4.7	
Iron	100	267	<u> </u>	1550		56.4	U	34,6	U	63,5		32.2 1	J	28.1		29.4		29.1		24.2	J
Magnesium	5000	30500		24200		10300		10400		7900		8040		237		439		393	]	340	Ĵ
Manganese	15	14.8		46.1		4.1		3.6		4.1		3.3		1.8		3.4		3,5		3,5	
Nickel	40	14.2	U	52.9		14.2	U	14.2	U	14.2	Ü	14.2 [	ו	14.2	_	14.2		14.2		14.2	
Potassium	5000	4330		5290		3070		3200		3890	<u> </u>	3820		1060		1060 (		1060		1060	
Silver	_10	4.6	Ū	2.2	บ	2.2	U	2.2	U ,	2.2		2.2	J	2.7	Ü	2.2 1	U	4.3	U	2.2	
Sodium	5000	17600	Г	15700		6640		6990		171000		172000		240		291		279		253	
Vanadium	50	23.1		31.3		22.3		21.8		26.8		23.2		3.8	u	8.2		6.4	}	4.9	
Zinc	20	40.7		65.9		46.8		19,4	U	27.9	٥	44.4		33,5		19.4	[	30.7	7	41.2	J
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12/8/95

EB = Equipment Blank

Aluminum	Project: BECHTEL-	-HANFO	RD		1																	
Sample Number	Laboratory: Quante	rra			1																	
Cocation		SDG: V	Y0721		<u></u>																	
Remarks	Sample Number		B0GJX3								Ĭ								<u> </u>		T	
Sample Date   09/15/95   09/20/95   09/18/	Location								199-N-	70												
Inorganic Analytes   CRDL   Result   Q   R															J						ļ —	
Aluminum									09/18/95													
Antimony   80   45.9 U   45.9 U   45.9 U   45.9 U   45.9 U   45.9 U   8   8   8   8   8   8   8   8   8	Inorganic Analytes	CRDL	Result -	Q							Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Barlum																l						
Beryllium								U		U		_								<u> </u>		
Cadmium         5         3.1         U         4.3         U         4.4         U         4.4         U         4.7         U         4.7 <t< td=""><td>Barium</td><td>200</td><td></td><td></td><td></td><td></td><td></td><td><u> </u></td><td></td><td></td><td></td><td><u>L</u></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Barium	200						<u> </u>				<u>L</u>										
Calcium         5000         1830         1790         36400         37100						<u> </u>						<u> </u>	<u> </u>		<u>·</u>							
Chromium         20         2.8         U         14.7         11.1				Ü		U		٦				<u> </u>		<u> </u>								
Cobalt         50         4.3         U         4.7         U         4.7 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>																						
Copper         25         4.7         U         18.4         4.7         U         4.7         U         4.7         U         9.7         U         1.0												Ĺ			l							
Iron         100         31.8         33.5         58.5         U         37.8         U           Magnesium         5000         375         484         10400         10600            Manganese         15         2.0         3.6         3.9         4.1            Nickel         40         14.2         U         14.2         U         14.2         U           Potassium         5000         1060         U         1060         U         3240         4330             Silver         10         2.4         U         2.2         U         2.2         U         2.2         U           Sodium         5000         1110         341         6780         7140	Cobalt					ט																
Iron         100         31.8         33.5         58.5         U         37.8         U           Magnesium         5000         375         484         10400         10600         Image: 10 moles of the control of	Copper	25	4.7	U											<u> </u>				l			
Manganese         15         2.0         3.6         3.9         4.1           Nickel         40         14.2         U         14.2         U         14.2         U           Potassium         5000         1060         U         1060         U         3240         4330         Silver         10         2.4         U         2.2         U         2.2         U         2.2         U           Sodium         5000         1110         341         6780         7140         7140	1 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	100		<u> </u>	33,5			U		U	<u> </u>											
Nickel         40         14.2 U											<u> </u>											
Potassium         5000         1060         U         1060         U         3240         4330           Silver         10         2.4         U         2.2         U         2.2         U         2.2         U           Sodium         5000         1110         341         6780         7140         7140	Manganese																			!		
Silver 10 2.4 U 2.2 U 2.2 U 2.2 U 500	Nickel							ב		U	<u> </u>											
Sodium 5000 1110 341 6780 7140	Potassium	5000			1060	U	3240				<u> </u>		<u> </u>			L						
	Silver	10	2.4	U	2.2	U		כ		_	l											
	Sodium	5000	1110				6780															
Vanadium 50 3.8 U 13.2 24.6 23.0	Vanadium	50	3.8	U	13.2																	$\Box$
Zinc 20 20.7 19.5 28.5 U 28.3 U	Zinc	20	20.7		19.5		28.5	٥	28.3	ט												1
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Sample Number		BOGJY4		B0GJY5																T T	_
Location		199-N-	21	199-N-	21			<u> </u>												<u> </u>	
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Sample Date		09/14/95		09/14/95																	
inorganic Analytes				Result	Q	Result	Q	Result	10	Result	Q	Result	Q	Result	10	Result	10	Result	Q	Result	Q
Aluminum	0.2	0.035		0.039	<u></u>		<u>L</u>		<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>L</u>						
Antimony	0.06	0.058				<u></u>	<u> </u>		<u> </u>	<u> </u>	<u>                                     </u>	<u> </u>	<u> </u>					<u> </u>			
Atsenic	0.01	0.098			U	<u> </u>	<u>L_</u>		<u> </u>	<u> </u>		<u> </u>	<u>L</u>	<u></u>	<u> </u>		<u></u>	<u> </u>	<u> </u>		
Barium	0.2	0.030		0.030				<u> </u>	<u> </u>		L	<u> </u>	<u></u>			l	<u> </u>	<u> </u>	I		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
Beryllium	0.005	0.0010	U	0.0010					<u> </u>			<u> </u>	L						Ĺ		
Cadmium	0.005	0.0050	Ü	0.0050	اد		I				<u> </u>										
Calcium	5	82		90			ſ								ſ			Ĭ .	$\overline{}$		
Chromium	0.01	0.0043		0.0030	U			Ī	Ī				П								
Cobalt	0.05	0,0060	Ü	0.0076					Γ				П		Г		T				
Copper	0.025	0,0030	Ü	0.0030	υ				{	1							1				
Iron	0.1	0.15		0.012	U				Γ.												
Lead	0.003	0.056	U	0.056	U								I				Ī				
Magnesium	5	17		18											L.		$\Gamma$				
Manganese	0.015	0.0042		0.0020	Ü										L.						
Mercury	0.0002	NA NA		NA.							L										
Nickel	0.04	0.015	5	0.015	٦																
Potassium	5	7.4		7.9													<u> </u>				
Selenium	0.005	0.087	5	0.087																	
Silver	0.01	0.0040	Ú	0.0040	U			<u> </u>				<u> </u>				i					
Sodium	5	150		150			Ĺ	Ĺ					_				Ĺ				$\Box$
Thallium	0.01	0.075		0.089																	
Vanadium	0.05	0.0080		0.0085													l				
Zinc	0.02	0.019	Ü	0.011					L		[				_		L				
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NA = Not Analyzed

# APPENDIX B METALS VALIDATED LABORATORY REPORT FORMS

### U.S. EPA - CLP EPA SAMPLE NO. INORGANIC ANALYSES DATA SHEET BOGJS8 Lab Name: QUANTERRA MOLab Code: ITMO Case Contract: 550.99 SDG No.: W0699 Case No.: SAS No.: Matrix (soil/water): WATER Level (low/med): LOW Solids: \_\_0.0 Lab Sample ID: 9364-001 Date Received: 09/15/95 Concentration Units (ug/L or mg/kg dry weight): UG/L\_ CAS No. M Analyte Concentration C P 24.6 U 7429-90-5 Aluminum Ð, 7440-36-0 Antimony 45.9 U Þ 7440-39-3 Barium 30.4 B 0.91 7440-41-7 Beryllium

7440-43-9	Cadmium	3.1	ט		P_	
7440-70-2	Calcium	73100	li		P_	
7440-47-3	Chromium	3.3	B		P_	
7440-48-4	Cobalt	4.3	שו		P-	
7440-50-8	Copper	29.2			P_	u
7439-89-6	Iron	228			P_	u
7439-95-4	Magnesium	15600	r-:		$P^-$	•
7439-96-5	Manganese	13.2	B		P P	
7440-02-0	Nickel	14.2			P_	
7440-09-7	Potassium	8560			$\bar{\mathbf{p}}^{-}$	
7440-22-4	Silver	2.2	ប៊		p-	
7440-23-5	Sodium	131000	~		P-	
7440-62-2	Vanadium	32.9	B	ļ	₽-	1 1
			رحم	[———	P-	$\widetilde{}$
7440-66-6	Zinc	21.6	4	<b></b>	-	~
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	:	INORGANIC I	l Analyses data s	SHEE'	T	EF	A SAMPLE NO.
Lab Name: QUANT Lab Code: ITMO Matrix (soil/wa Level (low/med) % Solids:	Case No ater): WATER ): LOW0.(	ī	Contract: 550 SAS No.: I	lab Date	SDG Sample Recei	e II Lvec	BOGJS9 : W0699 : 9364-002 : 09/15/95
	CAS No.	Analyte	Concentration	С	Q	М	
	7429-90-5 7440-36-0 7440-39-3 7440-41-7 7440-43-9 7440-47-3 7440-48-4 7440-50-8 7439-89-6 7439-96-5 7440-02-0 7440-02-7 7440-22-4 7440-66-6	Antimony Barium Beryllium Cadmium Calcium Chromium Chromium Cobalt Copper Iron Magnesium Manganese Nickel Potassium Silver Sodium Vanadium Zinc	3.1 75400 2.8 4.3 37.0 55.6 15900 8.0 14.2 9100 2.2 131000 43.7 21.1				u u u u u u
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Comments:			<del></del> -		~	つんぐ	

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U.S. EPA - CLP EPA SAMPLE NO. INORGANIC ANALYSES DATA SHEET BOGJT0 Contract: 550.99 Lab Name: QUANTERRA MO SDG No.: W0699 Lab Code: ITMO Case No.: SAS No.: Matrix (soil/water): WATER Level (low/med): LOW\_ Lab Sample ID: 9273-001 Date Received: 09/06/95 0.0 % Solids: Concentration Units (ug/L or mg/kg dry weight): UG/L\_ Concentration C Q M CAS No. Analyte P 24.6 U 7429-90-5 Aluminum P\_ Antimony 45.9 U 7440-36-0 p-7440-39-3 43.4 B Barium  $P^{-}$ 7440-41-7 Beryllium 0.61 8 P, 3.1 0 7440-43-9 Cadmium <u>29</u>000 Þ Calcium 7440-70-2 13.1 B P, 7440-47-3 Chromium  $\mathbf{P}^{\mathsf{T}}$ 4.3 U Cobalt 7440-48-4 14.2 B P 7440-50-8 Copper P 211 7439-89-6 Iron P\_ 7990 7439-95-4 Magnesium P 30.1 7439-96-5 Manganese 14.2 0 P 7440-02-0 Nickel Þ. 7440-09-7 Potassium 4810|B P, 7440-22-4 Silver 2.2 U Sodium 133000 P 7440-23-5 P\_ Vanadium 13.7 7440-62-2 P\_ Zinc 28.9 7440-66-6 u Clarity Refore: Color Pofore. Martine .

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### U.S. EPA - CLP EPA SAMPLE NO. INORGANIC ANALYSES DATA SHEET BOGJT1 Lab Name: QUANTERRA MO Contract: 550.99 Lab Code: ITMO SDG No.: W0699 Case No.: SAS No.: Lab Sample ID: 9273-005 Matrix (soil/water): WATER Date Received: Level (low/med): 09/06/95 LOW % Solids: 0.0 Concentration Units (ug/L or mg/kg dry weight): UG/L\_ Concentration | C CAS No. Analyte Q M 24.6 U 7429-90-5 Aluminum Antimony T P 7440-36-0 45.9 U ď 7440-39-3 42.6 B Barium P 7440-41-7 Beryllium 0.61 P 7440-43-9 Cadmium 3.1 U 7440-70-2 P Calcium T 28900 4.8 B P 7440-47-3 Chromium p-7440-48-4 Cobalt 4.3 U ď 7440-50-8 3.6|U Copper Þ, 175 lΨ 7439-89-6 Iron 7439-95-4 Magnesium 7870 P\_ P 7439-96-5 Manganese 33.6 14.2 0 D. 7440-02-0 Nickel Þ, Potassium 4740 B 7440-09-7 Þ, 2.2 0 7440-22-4 Silver 128000 P 7440-23-5 Sodium $P^-$ 20.1 3 7440-62-2 Vanadium P\_ 7440-66-6 Zinc 24.2 u

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		INORGANIC A	l Analyses data :	SHEET	EPA SAMPLE NO.
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Lab Name: QUAN			Contract: 55	0.99 <u> </u>	No.: W0699
Lab Code: ITMO Matrix (soil/wi Level (low/med % Solids:	ater): WATE ): LOW0.	R		Lab Sampl Date Rece	le ID: 9273-002 eived: 09/06/95
Co	ncentration	Units (ug,	/L or mg/kg dr	y weight)	: UG/L_
	CAS No.	Analyte	Concentration	C Q	M
	7429-90-5	Aluminum	25.0		P U
		Antimony_	45.9		_  P_
		Barium	51.6	B	- P-
		Beryllium	0.62	(B)	TIP IU
	7440-43-9	Cadmium_	3.1	<u>ש</u>	P
	7440-70-2	Calcium	43400		P
		Chromium	26.4		_]P_] ·
	7440-48-4	Cobalt	4.3	[T]	[P]
	7440-50-8	Copper	17.0		_]P_ U
	7439-89-6	Iron	582		[P_[
	7439-95-4	Magnesium	9400		_  <u>P</u> _
	7439-96-5	Manganese	49.5	<u> _ </u>	P_ P_
	7440-02-0	Nickel	16.6	B	_\ <u>P</u> _\
	7440-09-7	Potassium	6050		P P P
	7440-22-4	Silver	2.2	ט	P
	7440-23-5	Sodium	109000		_ P_
	7440-62-2	Vanadium	24.6	8	<u> </u>
	7440-66-6	Zinc	12.8	B	_ P_ U
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### U.S. EPA - CLP EPA SAMPLE NO. INORGANIC ANALYSES DATA SHEET BOGJT3 Lab Name: QUANTERRA MOLab Code: ITMO Case Contract: 550.99 Case No.: SDG No.: W0699 SAS No.: Matrix (soil/water): WATER Level (low/med): LOW\_ Lab Sample ID: 9273-006 09/06/95 Date Received: % Solids: 0.0 Concentration Units (ug/L or mg/kg dry weight): UG/L\_ M CAS No. Analyte Concentration C Q P 24.6 U 7429-90-5 Aluminum 45.9 U P Antimony\_ 7440-36-0 51.0 B Þ Barium Beryllium 7440-39-3 0.50 U p 7440-41-7 Þ 7440-43-9 Cadmium 3.1 0 42700 Þ 7440-70-2 Calcium 3.2 B P Chromium 7440-47-3 P 4.3 U Cobalt 7440-48-4 3.6 U P 7440-50-8 Copper p\_ u 101 7439-89-6 Iron P\_ 7439-95-4 Magnesium <u>9</u>320. P 7439-96-5 Manganese 34.7 P Nickel 14.2 | 😈 7440-02-0 5290 Þ, 7440-09-7 Potassium $\mathbf{p}^{\mathsf{T}}$ 7440-22-4 Silver 2.2 0 Ð. 113000 7440-23-5 Sodium 19.4 3 P\_ 7440-62-2 Vanadium p\_ 14.7 B Zinc 7440-66-6 U

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Lab Name: QUAN Lab Code: ITMO Matrix (soil/w Level (low/med % Solids:	Case No ater): WATE ): LOW0.0	<del></del>	Contract: 550 SAS No.:I I /L or mg/kg dry	SD Lab Samp Date Rec	le II eive	B0GJV0 .: W0699 D: 9347-003 d: 09/14/95
	CAS No.	Analyte	Concentration	C Q	м	
	7429-90-5 7440-36-0 7440-39-3 7440-41-7 7440-43-9 7440-47-3 7440-48-4 7440-50-8 7439-96-5 7440-02-0 7440-09-7 7440-22-4 7440-23-5 7440-66-6	Antimony_Barium Beryllium Cadmium_Calcium Chromium_Cobalt_Copper Iron Magnesium Manganese Nickel Potassium Silver Sodium	7.8	다 다 다 다 다 다 다 다 다 다 다 다 다 다 다 다 다 다 다	P P P	

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	:	INORGANIC A	1 ANALYSES DATA S	SHEET	EPA SAMPLE NO.
Lab Name: QUAN	TERRA MO		Contract: 550	0.99	B0GJV1
Lab Code: ITMO	Case No	o.:	SAS No.:	SDG	No.: W0699
Matrix (soil/wa	Ter) · WATE			ab Sample	ID: 9347-006
Level (low/med)	T.OM	••	Ť	Date Rece	ived: 09/14/95
Devel (Tow) wear	. 10 <u>~</u>	~	•	Jacc Mooc.	2.66. 05/24/55
% Solids:	0.0	J			
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	7429-90-5	X (11m) 111m	24.6	<del>     </del>	-
	7427-70-5	WITHITH THE			P P P P P P P P P P P P P P P P P P P
	7440-36-0	Antimony_	45.9		[5-]
	7440-39-3	Barium	72.4	B	I <b>≝_</b> I .
	17440-41-7	Bervllium	1.3	B]	P_  <b>니</b>
	7440-43-9	Cadmium	72.4 1.3 3.1	ַ   ד	P
	7440-70-2	Calcium	135000	]	P_
	7440-47-3	Chromium_	2.8	10	p <sup>-</sup>   .
	7440-48-4	Cobalt	4.3	]	[ <del>-</del> -
	7440-50-8	Copper	35.5	%	P-U
	7440-50-6	Copper	92.8	<b> </b>	
		Iron		ــــاطرا	[ <u>P</u> _[U
		Magnesium		]	<u>  _                                   </u>
	7439-96-5	Manganese	10.5	B	P
	7440-02-0	Nickel	15.9	B	P_ P_
	7440-09-7	Potassium	4890	B	P_(
	7440-22-4	Silver	9.3	R	P_ P_ V_
	7440-23-5	Sodium	49200	["	n-
	7440-23-3	2001 mm	34.4	<del>    </del>	p   u
		Vanadium	34.4		15-10
	7440-66-6	Zinc	15.7	ــــــاط	P_
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		INORGANIC A	l Analyses data .	SHEET	<u>E</u> .	PA SAMPLE NO.
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Lab Name: QUANT Lab Code: ITMO			Contract: 55		TIC NO	.: W0699
Matrix (soil/wa Level (low/med) % Solids:	ater): WATE ): LOW0.	R		Lab Sam Date Re	mple II eceive	D: 9336-002 d: 09/13/95
Co	ncentration	Units (ug	/L or mg/kg dr	y weigh	it): U	G/L_, 1
	CAS No.	Analyte	Concentration	1 1	M	
		Aluminum	24.6	וּדּוֹ	P	
	7440-36-0	Antimony_	45.9	וטן	P	1
		Barium	26.8	B	P	
		Beryllium	0.69	8	P	Ju
		Cadmium	3.1	[0]	P_	. <u>.</u>
		Calcium	30200		P	1
		Chromium_	2.8	[U]	P	,
		Cobalt	4.3	[0]	P_	1
	7440-50-8	Copper	9.0	B	P	Ju
	7439-89-6	Iron	36.7	<b> </b>	[P	u
		Magnesium	5280	_	P	<b>}</b>
		Manganese	4.6	\frac{1}{2}	P	Ju
	7440-02-0	Nickel	14.2		P	1
		Potassium	2310		P P	İ
		Silver	2.2		P-	•
		Sodium	3070	<del></del>	P-	lu
		Vanadium	14.9	1/21	P	
	7440-66-6	Zinc	36.6	८	<sup>F</sup> -	Ju.
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INORGANIC	ANALYSES	DATA	SHEET

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		INORGAMIC A	MADISES DATA	SUEET	
					B0GJV9
Lab Name: QUAN	רא גמקשיו	_	Contract: 550	0.99	
Lab Code: ITMO		<del></del>	SAS No.:		No.: W0699
				Sample	ID: 9336-004
Matrix (soil/w	ater): WAIE	X.	1	Date Recei	ved: 09/13/95
Level (low/med	): rom_	~	•	Dare Wecer	vea. 05/13/35
% Solids:	0	J			
<b>~</b>			/T /Iran	· ····································	TIC/T.
Co	ncentration	units (ug,	/L or mg/kg dry	y weight.	00/11_
	CAS No.	Analyte	Concentration	CQ	м
	,	l		<u></u>	<del>_</del> _
	7429-90-5		24.6	<u>                                     </u>	P
		Antimony_	45.9	[2]	5-1
	7440-39-3	Barium	28.0	<u>B</u>	P_ u
	7440-41-7	Beryllium	0.92	<u>                                      </u>	P_ 4
	7440-43-9	Cadmium	3.1	ا ــــــــا <sup>ت</sup> ا	P
		Calcium	30000	<u> </u>	<u>P_ </u>
		Chromium_	2.8	<u>                                     </u>	P
	7440-48-4	Cobalt	4.3	5	5-1.
	7440-50-8	Copper	23.0	/ <u>5</u>	P_U P_U
	7439-89-6	Iron	40.6	/B	P_U
		Magnesium	5300	=	5-1.
		Manganese	5.3 14.2	E	PLU
		Nickel	14.2	1211	P
		Potassium			P-
		Silver	2.2		2-1
	7440-23-5	Sodium	3020		P
	7440-62-2	Vanadium_	27.2	[E]	PU
	7440-66-6	Zinc	12.2	B	P_ \( \text{\tint{\text{\tin}\text{\texi\text{\texi}\tint{\text{\text{\text{\text{\text{\text{\text{\text{\texi\}\ti}\\\ \ti}}\\tittt{\text{\ti}\tittt{\text{\texi}}\\tinttitet{\text{\text{\text{\texi}}}\t
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INORGANIC	ANALYSES	DATA	SHEET

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	•	INORGANIC 2	1 ANALYSES DATA :	SHEET	EPA SAMPLE NO.
Tale Manage Arrange					BOGJWO
Lab Name: QUAN Lab Code: ITMO			Contract: 550	ਹ. ਤਤ <u>਼</u> ਕੁਜਟ	No.: W0699
			SAS NO.:		ID: 9273-003
Matrix (soil/willing Level (low/med		X	;	Date Recei	ved: 09/06/95
% Solids:	0.0	ក	•	Date reces	05,00,55
% POTTUS:		J			
Co	ncentration	Units (ug,	/L or mg/kg dry	y weight):	UG/L_
	CAS No.	Analyte	Concentration	C Q	м
•					P
	7429-90-5	Aluminum_	24.6		P-
		Antimony_	45.9		P-
		Barium	17.9	[#]	P-
	7440-41-7		]	[유]	P-
	7440-43-9	Cadmium_	3.1	'	P
	7440-70-2 7440-47-3	Chromism	3.1	=	P
	7440-48-4		4.3	[計]————————————————————————————————————	<del>p</del> -1
	7440-50-8	Copper	13.6	N	P_ U
	7439-89-6	Iron	41.0	[FI	PUL
	7439-95-4	Magnesium	4890	<u> </u>	P CC
	7439-96-5			8	P
	7440-02-0		14.2	0	P
	7440-09-7				P_ P_ P_ U
	7440-22-4		2.2	וטו	P-
	7440-23-5		2990		P
	7440-62-2		7.2	B	P <sup>-</sup> IU
	7440-66-6	Zinc	10.4	(B)	PIU
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## 1 INORGANIC ANALYSES DATA SHEET

EPA	SAMPLE	NO
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	:	INORGANIC A	NALYSES DATA S	SHEET	1
	mmna .co		Contract - FF	n 00	BOGJW1
Lab Name: QUAN	TERRA MO		Contract: 550	U.99	No.: W0699
Lab Code: ITMO	Case No	2.:	SAS No.:		
Matrix (soil/wa	ater): WATE	R	, j	Lap Sampie	ID: 9273-004 ved: 09/06/95
Level (low/med)	): FOM	<del></del>	1	Date Recei	.ved. 03/06/33
% Solids:	0	J			
Cor	ncentration	Units (ug/	/L or mg/kg dry	y weight):	UG/L_
	1				
	CAS No.	Analyte	Concentration	-	M
	7429-90-5	Aluminum	24.6	T	P_ P_
	7440-36-0	Antimony	45.9	וטו	P_}
	7440-39-3	Barium	18.6		P_[
		Beryllium		B	P <sup>™</sup> }U
	7440-43-9	Cadmium	3.1	<del>[[</del>	p
		Calcium	28500	~	<del>  p  </del>
		Chromium	2.8	Į <sub>₹7</sub>	P .
			4.3	[#]	P-
	7440-40-4	Cobalt		\$/	5-11
	7440-50-8	Copper	5.2 56.2		P
		Iron	56.2	الح ا	P_ U
		Magnesium		#	
	7439-96-5	Manganese	4.5	<u>                                      </u>	PLU
	<b>5</b>	Nickel	14.2	[0]	P
		Potassium		B	<u>P</u> _
	7440-22-4	Silver	2.2	[U]	P
	7440-23-5	Sodium	3000		P_
	7440-62-2	Vanadium	16.3	<b>B</b>	P_ U
	7440-66-6	Zinc	16.1	B(	PIU
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		v.s.	EPA - CLP		•		`
	:	INORGANIC A	1 Analyses data (	SHE	ET	E	PA SAMPLE NO.
Lab Name: QUANT Lab Code: ITMO Matrix (soil/wa Level (low/med) % Solids:	Case No Atter): WATE	D.: R	Contract: 550 SAS No.: I I	Jab Dat	SDG Sample e Rece	e II ive	B0GJW4 .: W0699 D: 9319-001 d: 09/12/95
	CAS No.	Analyte	Concentration	С	Q	м	
	7429-90-5 7440-36-0 7440-39-3 7440-41-7 7440-43-9 7440-47-3 7440-48-4 7440-50-8 7439-89-6 7439-96-5 7440-02-0 7440-09-7 7440-22-4 7440-23-5 7440-66-6	Antimony_Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Magnesium Manganese Nickel Potassium Silver Sodium Vanadium Zinc	3.1 34100 199 4.3 19.7 94.5 16300 7.7 14.2 4900 2.2 24100 31.1 14.5	क्ष तस्तक्ष क्ष्या। तक्षमत		P	44 4 44
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		v.s.	EPA - CLP		
	:	INORGANIC A	l ANALYSES DATA :	SHEET	EPA SAMPLE NO.
Lab Name: QUAN	TERRA MO		Contract: 550	0.99	BOGJW5
Lab Code: ITMO		0.:	SAS No.:	SDG	No.: W0699
Matrix (soil/w	ator) · WATE	· ·			B ID: 9319-002
7 7 /1 /m - 21	TOTAL		7	Jato Dogo:	ived: 09/12/95
Level (low/med)	): LOW_	<del></del>	4	Jace Rece.	Lveu: 09/12/95
% Solids:	0.	0			
Cor			/L or mg/kg dry	y weight)	: UG/L_
	1 ————				<del> </del>
	CAS No.	Analyte	Concentration	C Q	М
	7429-90-5	Aluminum	24.6	fi	P
		Antimony	45.9		P-
			31.5		{ <del>5</del> − {
		Barium			P_ U
	7440-41-7	Beratrim	0.92	×	[ <u>P</u> _[U
	7440-43-9	Cadmium	3.1		P
	7440-70-2	Calcium	33600		P_  -
	7440-47-3		179		P .
	7440-48-4	Cobalt	4.3		P ·
	7440-50-8	Copper	78. 2	<del> </del>	P_U
			18.2 41.7	<b>   </b>	1 1
	7439-89-6	Iron	]	P	P_ U
	7439-95-4	Magnesium			15-1
	7439-96-5	Manganese	7.4	J&	P_ U
	7440-02-0		14.2		P
	7440-09-7	Potassium	5220		P
•	7440-22-4	Silver	2.2	<del> </del>	P_ P_ P_ UP_ UP_ UP_ UP_
	7440-23-5		23300		p
	7440-62-2	Vanadium	36.6	<del>                                    </del>	Pu
	7440-66-6	Zinc	36.3	1%	
	7440-00-0	ZILLC		K-1	P_  U
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	:	INORGANIC A	1 NALYSES DATA S	SHEET	EPA SAMPLE NO.	
			1		B0GJX4	_
Lab Name: QUAN	TERRA MO		Contract: 550	0.99	D0G0X4	
Lab Code: ITMO		0.:	SAS No.:	SDG	No.: W0699	
Matrix (soil/wa		.2	Ī		ID: 9347-002	_
Level (low/med)		_	r	Date Recei	Lved: 09/14/95	
% Solids:	0.0	0				
Con	naantmatian	Thite las	/T ' and may/leas along	· ····································	. IIC /I	
CO	ncentration	onics (ug/	Lor mg/kg dry	/ werdur):	, og/T_	
	CAS No.	Analyte	Concentration	C Q	M	
	CAD INC.	Miaryce	CONCENCIACION			
	7429-90-5	Aluminum	24.6	<u></u>	P	
		Antimony_	45.9	U	P_	
		Barium	5.0	B	P_   P_	
	7440-41-7	Beryllium	0.92	B	P_	,
	7440-43-9	Cadmium	3.1		P_	
	<b> 7440-70-2</b>	Calcium	1850	В	P_ P_ P_	
		Chromium_	2.8		[P_]	
	7440-48-4	Cobalt	4.3	U	P	
	7440-50-8	Copper	21.1	B	P_	
			37.5	B	P_   P_	
		Magnesium	649		[ <u>P_</u> ]	
		Manganese	4.5	B	P	
	7440-02-0	Nickel	14.2		P_	
	7440-09-7	Potassium	1130	B	p_ p_ p_	
		Silver	4.1	B	P	
	7440-23-5	Sodium	464	B	<u>  P_  </u>	
	7440-62-2	Vanadium_ Zinc	21.0	B	P	
	7440-66-6	Zinc	14.2	B	P_	
				_	l1	
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INORGANIC ANALI	SES DATA SHEET
	B0GJX5
Lab Name: QUANTERRA MO Cor	ntract: 550.99
Lab Code: ITMO Case No.: SA	AS No.: W0699
Matrix (soil/water): WATER	Lab Sample ID: 9347-004
Level (low/med): LOW	Date Received: 09/14/95
% Solids:0.0	

Concentration Units (ug/L or mg/kg dry weight): UG/L\_

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CAS No.	Analyte	Concentration	С	Q	М
7429-90-5	Aluminum	24.6	ប		P_
7440-36-0	Antimony	45.9			P-
7440-39-3	Barium	4.2			P-
7440-41-7	Beryllium	0.92			P-
7440-43-9	Cadmium	3.1			$\mathbf{P}^{-}$
7440-70-2	Calcium	1740		<del></del>	P-
7440-47-3	Chromium	2.8			P-
7440-48-4	Cobalt	4.3	ŭ		-a
7440-50-8	Copper	٥. و	В		P_
7439-89-6	Iron	$\frac{32.7}{3}$	В		P-
7439-95-4	Magnesium	640	В		$ \tilde{P}^- $
7439-96-5	Manganese	4.2	В		$\mathbf{P}^{-}$
7440-02-0	Nickel	14.2			$_{\rm P}^{-}$
7440-09-7	Potassium	1450			$_{ m P}^{-}$
7440-22-4	Silver	2.2			
7440-23-5	Sodium	449	В		P P
7440-62-2	Vanadium	19.6			P-
7440-62-2	Zinc	13.6	В		P-
7440-00-0	ZIIIC		Δ.		-
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# 1 INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

		THOROGENIC F	MAHIOND DAIA .	بر تانانار	
o Name: QUAN	ጥፎዊያል MO		Contract: 550	1 99	B0GJX8
Code: ITMO	TELLICATION TO THE		SAS No.:		No.: W0699
code: ilno	Case IV	g.:	SAS NO.:		
rix (soil/w	ater): WATE	K	<u>i</u>	ap sambre	ID: 9347-001
el (low/med)	): LOW_	_	I	Date Recei	ved: 09/14/95
olids:	0-	0			
Con	ncentration	Units (ug,	/L or mg/kg dry	y weight):	UG/L_
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	CAS No.	Analyte	Concentration	C Q	М
	7429-90-5	Aluminum	37.1	[B]	PUT
	7440-36-0	Antimony	45.9	יטו	P
		Barium	72.1	B	P
		Beryllium	1.5	R	P_ U
	7440-43-9	Cadmium	1.5	[m]———	<del>p</del> -
	7440-70-2	Calcium	135000		P
			133600	<u> </u>	ודמ
		Chromium_	6.3	[유]	5-1
		Cobalt	4.3		5-1.
	7440-50-8	Copper	21.6	<u>ا ـــــا</u>	5-14
	7439-89-6	Iron	103	1_1	P U P U
		Magnesium		l_ll	P_
	7439-96-5	Manganese	10.3	B I	P   P   P   P   P   P   P   P   P   P
	7440-02-0	Nickel	14.2	וטו	P
	7440-09-7	Potassium	5830	1	P
		Silver	3.5	(B)	P
	7440-23-5	Sodium	49300		<del>p</del> -
		Vanadium	37.4	اام	P_ U
	7440-66-6	Zinc	32.8	[ <sup>2</sup> ]	P_ U \
	7440-66-6	Z111C	32.8	-	F_  U W
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or After:		Clari	tŷ After: 🔃		Artifacts:
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	•	INORGANIC A	MADIODO DAIA	SHEDI	{
					B0GJX9
Lab Name: QUAN	TERRA MO		Contract: 550	0.99	
Lab Code: ITMO			SAS No.:	SDG	No.: W0699
Matrix (soil/w		R	<u>1</u>	lab Sample	ID: 9347-005
Level (low/med	): LOW	=	I	Date Recei	ived: 09/14/95
% Solids:	0.0	D			
Co	ncentration	Units (ug,	/L or mg/kg dry	y weight):	: UG/L_
	, <del></del>				<del></del> 1
	CAS No.	Analyte	Concentration	C Q	м
				<u></u>	P
	7429-90-5	Aluminum_	24.6	[::]	P-
	7440-36-0	Antimony_	45.9		P-
	7440-39-3	Barium	74.3	B	p-u
	7440-41-7	Beryllium	1.5 3.1	(유)	F
	7440-43-9	Cadmium_	140000		P -
	7440-70-2	Calcium	140000	▎ <sub>▜▜</sub> ▗▎ <del>▃▃</del> ▃▃░	P .
	7440-47-3	Chromium_		<del>   </del>	5-1
	7440-48-4	Cobalt	4.3 31.6		P-U P-U P-U
	7440-50-8	Copper	90.8	E	PU
	7439-89-6	Iron	23300	ـــــا طرا	15-1 <b>%</b>
	7439-95-4	Magnesium		B	P-
	7439-96-5	Manganese	10.4		P-
	7440-02-0	Nickel	14.2		<del>-</del> -
	7440-09-7		6470	+	P P
	7440-22-4			<sup> </sup>	P_
	7440-23-5	Sodium	49600	<del></del>	P-4
	7440-62-2	Vanadium_	42.3		
	7440-66-6	Zinc	15.8	P	P_  <b>4</b>
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Galam Dafama		G]:	to Defense		Texture:
Color Before: Color After:		Clari	ty Before:		Artifacts:
COTOL WIGHT:		Clari	ty After:	<del></del>	ALCILACES:
Comments:		•			740
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	;	INORGANIC 2	1 ANALYSES DATA :	SHEET	EPA SAMPLE NO.
Lab Name: QUAN Lab Code: ITMO Matrix (soil/w Level (low/med % Solids:	Case Notes atter): WATE	o:: R	I	SDG Lab Sample Date Rece	B0GJY2 No.: W0699 E ID: 9336-001 ived: 09/13/95
Cor	ncentration	Units (ug/	L or mg/kg dry	y weight)	: UG/L_
	1	<del></del>			<del></del> 1
	CAS No.	Analyte	Concentration	C Q	м
	7440-39-3 7440-41-7 7440-43-9 7440-70-2 7440-47-3 7440-50-8 7439-89-6 7439-95-4 7439-96-5 7440-02-0 7440-09-7 7440-22-4 7440-23-5	Antimony Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Magnesium Manganese Nickel Potassium Silver Sodium Vanadium Zinc	29400 2.8 4.3 11.6 30.9 5140 3.7	DE CORPORTED COR	中中中中中中中中中中中中中中中中中中中中中中中中中中中中中中中中中中中中
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Color Before: Color After:		Clari Clari	ty Before:		Texture:
Comments:				pas	11/12/95
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FORM I - IN

# Lab Name: QUANTERRA MO Contract: 550.99 Lab Code: ITMO Case No.: SAS No.: SDG No.: W0699 Matrix (soil/water): WATER Lab Sample ID: 9336-003 Level (low/med): LOW Date Received: 09/13/95 % Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L\_

1	<del>,</del>	<del></del>	_			
CAS No.	Analyte	Concentration	С	Q	M	
7429-90-5	Aluminum	24.6	ប៊		P	
7440-36-0	Antimony_	45.9			P P P P	
7440-39-3	Barium	26.4	В		P—	
7440-41-7	Beryllium	0.92			P-1	u
7440-43-9	Cadmium	3.1	ש		₽-	~
7440-70-2	Calcium	29200			P - P - P - P - P - P - P - P - P - P -	
	Chromium	2.8	ច	<del></del>	D-	
7440-48-4	Cobalt	4.3	ט		P_	
7440-48-4		19.6			P-	u
	Copper	39.1	<b>(2)</b>		5-1	
7439-89-6	Iron		rs		P	U
7439-95-4	Magnesium	5140	=		15-1	
7439-96-5	Manganese	5.1	F		P P P P	Ч
7440-02-0	Nickel	14.2	ับ		15-1	
7440-09-7	Potassium	2510			<u>   </u>	
7440-22-4	Silver	2.2	שׁ		P_	
7440-23-5	Sodium	2960	ا ا			
7440-62-2	Vanadium	25.4	逐		P_	U
7440-66-6	Zinc	12.3	B		P	ч
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Comments:			235 11/12/45
	 FORM I -	IN	sŵ-846

		0.5.	EPA - CLP			
		INORGANIC A	l ANALYSES DATA	SHEET	EPA SAMPLE	NO.
Lab Name: QUAN Lab Code: ITMO Matrix (soil/w Level (low/med % Solids: Co	Case Nater): WATE ): LOW0.	R	Contract: 55 SAS No.:	SDG Lab Sampl Date Rece		003
	7440-39-3 7440-41-7 7440-43-9 7440-70-2 7440-48-4 7440-50-8 7439-89-6 7439-95-4 7439-96-5 7440-02-0 7440-09-7 7440-22-4 7440-23-5	Calcium Chromium Cobalt Copper Iron Magnesium Manganese Nickel Potassium	Concentration  44.2 45.9 158 0.84 3.1 172000 9.8 4.3 21.8 267 30500 14.8 14.2 4330 4.6 17600 23.1 40.7	U B U B U B U B U B U B U B U B U B U B	M PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP	
Color Before: Color After:		Clarit	y Before:		Texture: Artifacts:	·
Comments:		CTALL	y Arcer:		272	
					12/195	

FORM I - IN

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### U.S. EPA - CLP

### 1 INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

		TMOKGHMIC I	HIADISES DAIA	THURT	1	
					B0GJV2	
ab Name: QUANTERRA MO			Contract: 55		-	
ab Code: ITMC		<del></del>	SAS No.:	No.: W0721		
atrix (soil/w					D: 9404-	004
		ĸ				
evel (low/med		<del>7.</del>	<u>-</u>	Date Recei	ived: 09/21	./95
Solids:	0.	U				
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Co	ncentration	units (ug	/L or mg/kg dr	y weight):	: UG/L_	
	CAS No.	Analyte	Concentration	C Q	М	
	7429-90-5	Aluminum	632	-  <del></del>	P	
	7440-36-0	Antimony	45.9	ן טו	P	
	7440-39-3		122		p <sup>-</sup>	
		Beryllium	1.1		Pu	😅
	7440-43-9	Codmina	3.1		P-	
		Calcium	115000		[P-	
					<u> </u>	
	7440-47-3		89.8	<u></u>	P	
	7440-48-4		4.3	["	P P	
	7440-50-8	Copper	30.3		P_	
	7439-89-6	Iron	1550		P_	
		Magnesium	24200		P_	
	7439-96-5	Manganese	46.1	-	P P	
	7440-02-0		52.9		P	
		Potassium	5290		P	
	7440-22-4		2.2	<sub>     </sub>	P P	
	7440-23-5		15700		p_	
	2	Vanadium	31.3	l=1	5-	
	7440-62-2	Zinc		°	P	
	7440-66-6	Z111C	65.9	-	<b>-</b> -	
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mments:						
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		TNORGANTC :	l ANALYSES DATA S	сивит	EPA SAMPLE NO.
		11.01.01.11.10	WALLSES DAIA	********	BOGJV6
ab Name: QUAN	TERRA MO		Contract: 550	0.99	) 2000.0
ab Code: ITMO		0.:	SAS No.:	SDG	No.: W0721
atrix (soil/w				lab Sampl	e ID: 9380-001
evel (low/med	.): LOW		Ī	Date Rece	ived: 09/19/95
Solids:	0-	<u> </u>			
Co	ncentration	Units (ug	/L or mg/kg dry	y weight)	: UG/L_
	CAS No.	Analyte	Concentration	C Q	М
	7429-90-5	Aluminum	24.6	₩	·   <del>                                   </del>
	7440-36-0	Antimony_	45.9		P_ P_ P_
	7440-39-3	Barium	35.4		-  <del>-</del>  -
	7440-41-7	Beryllium		[#]	·   <del>^</del> <del>-</del>   · -
		Cadmium	3.1	[ <del>                                    </del>	· 5-
	7440-70-2		36400	°	-15-1
		Chromium	11.5		·  <del>5</del> -
		Cobalt	4.3	유	P_ P_ P_ P_ P_
					-   5
		Copper	4.7	[씱	P u
	7439-89-6	Iron	56.4	———اصا	P C
		Magnesium	10300	<u> </u>	-{ = 1
		Manganese	4.1	<u> </u>	P_ P_ P_ P_ P_ P_
		Nickel	14.2		·1 <u>5</u> -1
		Potassium		B	.  <u>.</u>
		Silver	2.2	บ	.  <u>P</u> _
		Sodium	6640	<u> </u>	-1 <i>E</i> 1
		Vanadium_	22.3	B	. P
	7440-66-6	Zinc	46.8		[P_
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omments:					- 4 1
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#### U.S. EPA - CLP

### 1

EPA	SAMPLE	NO.
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INORGANIC ANALYSES DATA SHEET	
	B0GJV7
Lab Name: QUANTERRA MO Contract: 550.99 Contract: 550.99 SAS No.: SDG N	No.: W0721
	ID: 9380-003
Level (low/med): LOW Date Receiv	red: 09/19/95
% Solids:0.0	

Concentration Units (ug/L or mg/kg dry weight): UG/L\_

Color Before:	Clarity Before:	Texture: Artifacts:
Comments:		<u> </u>
		12/1/95
	FORM I - IN	SW-846

# 1 EPA SAMPLE TNORGANIC ANALYSES DATA SHEET

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EPA	SAMETE	MO

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INORGANIC	ANALYSES	DATA	SHEET

EPA SAM	PLE	NO
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		INORGANIC :	analyses data :	SHEET	
wab Name: QUAN wab Code: ITMO Matrix (soil/w wevel (low/med Solids:	Case N ater): WATE	R	Contract: 556 SAS No.:	SDG Lab Sample	B0GJW3 No.: W0721 ID: 9375-005 ved: 09/18/95
Co	ncentration	Units (ug	/L or mg/kg dry	y weight):	UG/L_
	CAS No.  7429-90-5 7440-36-0	Antimony_	Concentration 24.6 45.9	<u></u>	M P P
	7440-39-3 7440-41-7 7440-43-9 7440-70-2 7440-47-3 7440-48-4	Beryllium Cadmium Calcium Chromium	37.9 0.50 3.1 31200 3.2	ט ט	P P P P
	7440-50-8 7439-89-6 7439-95-4 7439-96-5	CopperIronMagnesium Manganese Nickel	4.3 4.7 32.2 8040 3.3 14.2	B	P- P- P- P- P-
	7440-09-7 7440-22-4 7440-23-5	Potassium Silver	3820 2.2 172000 23.2 44.4	B	p
olor Before: olor After:		Clarit Clarit	y Before:		Texture: Artifacts:
omments:					RDS 12/1195
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	INORGANIC	1 ANALYSES DATA SH		EPA SAMPLE NO.
ab Name: QUANTERRA MO	NO.: ER .0	Da	SDG N Sample te Receiv	B0GJW6  O.: W0721  ID: 9375-001  ed: 09/18/95
CAS No.  7429-90-5 7440-36-0 7440-39-3 7440-41-7 7440-43-9 7440-70-2 7440-47-3 7440-48-4 7440-50-8 7439-89-6 7439-95-4 7439-96-5 7440-02-0 7440-02-0 7440-22-4 7440-23-5	Analyte  Aluminum Antimony Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Magnesium Manganese Nickel Potassium Silver Sodium Vanadium Zinc  Clari	5.2 B 0.50 U 3.1 U 1700 B 2.8 U 4.3 U 4.7 U 28.1 B . 237 B . 1.8 B 14.2 U	Q M PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP	
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# U.S. EPA - CLP

ab Code: ITMO	ab Name: QUANTERRA MO		1 INORGANIC ANALYSES DATA SHEET	EPA SAMPLE NO.
CAS No.	CAS No. Analyte Concentration C Q M    7429-90-5	ab Code: ITMO	SAS No.: SDO ATER Lab Sampl W Date Rece	
7429-90-5 7440-36-0 7440-39-3 Rarium 7440-41-7 7440-43-9 7440-70-2 Calcium 7140-70-0 Calcium 7440-47-3 Chromium 7440-50-8 7439-89-6 7439-89-6 7439-96-5 Manganese 7440-02-0 Nickel 7440-02-1 Slower 7440-22-4 Silver 7440-22-4 Silver 7440-22-4 Silver 7440-66-6 Silver 729-18-8 7440-66-6 Silver 729-18-8 7	T429-90-5	Concentrati	on Units (ug/L or mg/kg dry weight)	: UG/L_
7440-36-0   Antimony   45.9   U   P   7440-39-3   Barium   5.2   B   P   7440-41-7   Reryllium   0.67   R   P   P   7440-41-7   Reryllium   3.1   U   P   7440-40-2   Caldium   1.780   B   P   7440-48-4   Cobalt   4.3   U   P   7440-48-4   Cobalt   4.3   U   P   7439-89-6   Iron   29.4   R   P   7439-89-6   Iron   29.4   R   P   7439-96-5   Manganese   3.4   B   P   7440-02-0   Mickel   14.2   U   P   7440-02-0   Mickel   14.2   U   P   7440-22-4   Silver   2.2   U   P   7440-22-4   Silver   2.2   U   P   7440-66-6   Zinc   19.4   R   P   P   7440-66-6   Zinc   19.4   R   P   P   7440-66-6   Zinc   19.4   R   P   P   T   T   T   T   T   T   T   T	7440-36-0	CAS No.	Analyte   Concentration C   Q	м
	omments: Clarity After: Artifacts:	7440-36- 7440-39- 7440-41- 7440-43- 7440-47- 7440-48- 7440-50- 7439-89- 7439-95- 7439-96- 7440-02- 7440-02- 7440-62- 7440-66-	Antimony	P P P P P P P P P P P P P P P P P P P

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		INODONNIC 1	l ANALYSES DATA S	211121200	EPA SAMPLE NO	).
	,	INORGANIC F	MWRIPES DATH :	OUFFI	1	
					B0GJX0	
Lab Name: QUAN			Contract: 550			
Lab Code: ITMO Matrix (soil/wa			SAS No.:	SDG	No.: W0721	
Level (low/med)	): LOW	K.	Ţ	Lab Sample	e ID: 9404 <del>-003</del> ived: 09/21/95	
% Solids:	0	o o	•	Jace Rece.		
Co	ncentration	Units (ug/	'L or mg/kg dry	y weight):	: UG/L_	
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	CAS No.	Analyte	Concentration	c Q	м	
		************		`	**	
		Aluminum			P	
	7440-36-0	Antimony_	45.9		[P_]	
		Barium	5.2	В	p p p p	_
	7440-41-7	Beryllium	0.50	ט –	[P_	
		Cadmium	3.1		P	
	7440-70-2	Calcium	1820	В	P_	
		Chromium	2.8	U	IP !	
	7440-48-4	Cobalt -	4.3	יט יי	P 1	
	7440-50-8	Copper	4.7	וט	[P"]	
		Iron	29.1	28 T	P_ 0	
	7439-95-4	Magnesium	393	В	P \	
	7439-96-5	Manganese	3.5	B	] p	
		Nickel	14.2	ש	P_	
		Potassium	1060		P	
		Silver	4.3		P_	
		Sodium	279		P-	
		Vanadium	6.4		p	
	7440-66-6	Zinc	30.7	<u> </u>	P   P   P	
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Color After:		Clarit	y After:		Artifacts:	
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Comments:						
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FORM I - IN

EPA SAMPLE NO.

		INORGANIC A	ANALYSES DATA S	SHEET	4
Lab Name: QUAN Lab Code: ITMO		0.:	Contract: 550	).99 <u> </u>	B0GJX2
Matrix (soil/w Level (low/med % Solids:	ater): WATE	R	<u></u>	Lab Sample	
& POTTOR:	0	U			
Co.	ncentration	Units (ug,	/L or mg/kg dry	y weight):	UG/L_
	CAS No.	Analyte	Concentration	C Q I	м
	7429-90-5	Aluminum	24.6	<del> </del>	F J
	7440-36-0	Antimony_	45.9	: ווטו	P_  T
	7440-39-3	Barium	3.1		P_   =
	7440-41-7	Beryllium	0.50		P_ ; }
	7440-43-9 7440-70-2	CadmiumCalcium	3.1		P '
	7440-47-3	Chromium	4.8	$ \mathbf{B} $	P <sup>-</sup>
	7440-48-4	Cobalt	4.3	<del> </del>	P
	7440-50-8	Copper	4.7	יטו	P
	7439-89-6	Iron	24.2	B	P_
	7439-95-4	Magnesium		B	P_  
	7439-96-5 7440-02-0	Manganese Nickel	14.2	[#]	P-
	7440-02-0	Potassium		{ير}	P
	7440-22-4	Silver	2.2		P-
	7440-23-5	Sodium	253	B	P
	7440-62-2	Vanadium	4.9	B	P
	7440-66-6	Zinc	41.2	]_	₽_  ₩
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Comments:					
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#### U.S. EPA - CLP

EPA SAMPLE NO.

		INORGANIC A	MALYSES DATA S	SHEET	
					Dog 7772
					B0GJX3
Lab Name: QUAN			Contract: 550	).99 <u></u> _	<u> </u>
Lab Code: ITMO	Case N		SAS No.:	SDG	No.: W0721
Matrix (soil/wa		R	I	lab Sample	ID: 9375-007
Level (low/med)	): LOW_		I	Date Recei	ved: 09/18/95
% Solids:	0.	0			
	<del></del>				
Cor	ncentration	Units (ug,	/L or mg/kg dry	y weight):	: UG/L_
					· · · · ·
			·		
	CAS No.	Analyte	Concentration	C Q	M
					<u>_</u> _
	7429-90-5		24.6	<u> </u>	P P
	7440-36-0	Antimony_	45.9	ا <u>ت</u> ا ا	<u>  _  </u>
	7440-39-3	Barium	5.2	В	P
	7440-41-7	Beryllium	0.50	U	P_ _
	7440-43-9	Cadmium	3.1	[U]	<u>P</u>
	7440-70-2	Calcium_	1830	B	P
	7440-47-3	Chromium_	2.8	[U]	<u> P.  </u>
	7440-48-4	Cobalt	4.3		<u>P</u> _
	7440-50-8	Copper	4.7		P_
	7439-89-6	Iron	31.8	B	P_
	7439-95-4	Magnesium	31.8 375	B	P_
	7439-96-5	Manganese	2.0	[B]	P_ P_
	7440-02-0	Nickel	14.2		<u>P  </u>
	7440-09-7	Potassium	1060	U	P_ P_
	7440-22-4	Silver	2.4	σ	P_
	7440-23-5	Sodium	1110		P_ P_
	7440-62-2	Vanadium	_3.8		[P
	7440-66-6	Zinc	20.7		P
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	·				Manufacture
Color Before:		Clari	ty Before:		Texture:
Color After:		Clari	ty After:		Artifacts:
Comments:					
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		U.S.	EPA - CLP			
		INORGANIC A	l ANALYSES DATA :	SHEET	EPA SAMPLI	E NO.
Lab Name: QUAN Lab Code: ITMO Matrix (soil/w Level (low/med % Solids:	Case N ater): WATE ): LOW 0.	R 0		SDG Lab Sample Date Recei	BOGJX6 No.: W0721 D: 9404 ived: 09/23	
	CAS No.	_	Concentration		М	
	7429-90-5		24.6		<u>P_</u>	
		Antimony_	45.9		P_	
	7440-39-3 7440-41-7	Barium	7.0		P u	·
	7440-43-9		3.1	Ka ka	P - 4	
	7440-70-2		1790		P	
	7440-47-3		2.8	<u></u>	P	
	7440-48-4		4.3	י די	P_{	
	7440-50-8	Copper	18.4 33.5	В	[P_]	
		Iron	33.5	BB	P_ \u_	
	7439-95-4	Magnesium	484	B	P P	
		Manganese	3.6	B	P	
	7440-02-0	Nickel	14.2		P	
		Potassium	1060	<u>u</u>	p_ p_ p_	
		Silver	2.2	<u> </u>	P_1	
		Sodium	341	<del> </del>	P P	
	7440-62-2 7440-66-6	Vanadium_ Zinc	13.2 19.5	[문]		
	1-50-00-0	ZIIIC		/ <sup>2</sup> / <sup>2</sup> ———[	5-101	
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Color Before:		Clarit	y Before:		Texture:	
Color After:		Clarit	y After:	<del></del>	Artifacts:	
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Comments:						189.

SW-846

FORM I - IN

# INORGANIC ANALYSES DATA SHEET

EPA	SAMPLE	NO.

	•		DAIM .			1	
Lab Name: QUAN	TERRA MO	•	Contract: 550	0.9	9		B0GJY0
Lab Code: ITMO	Case No	0. :	SAS No.:		SDG	NO	.: W0721
Matrix (soil/w				1.ah			D: 9380-002
Level (low/med					o Book		d: 09/19/95
	): TOM-	~	Į.	Dat	.e kece.	rve	1: 03/13/35
% Solids:	0	U					
Co	ncentration	Units (ug.	/L or mg/kg dr	v w	reight)	: บัง	3/L
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	CAS No.	Analyte	Concentration	اما	Q	м	1
	CAS NO.	MIGTACE	CONCENCTACTON	151	V	1.1	
	7429-90-5	71111111111	24.6	77		P	1
						P-	<b> </b>
	7440-36-0	Antimony_	45.9	101			ļ
		Barium	35.1	B		P_	<u> </u>
		Beryllium				P	
	7440-43-9	Cadmium	3.1	וטו		P	i
		Calcium	36400			P   P	
		Chromium	14.7	F		P	ſ
		Cobalt	4.3	177		P_	{
						<u>-</u>	
		Copper	4.7	וטן		P_ P	
		Iron	58.5	[B]		Ρ	4
		Magnesium	10400			P_	
	7439-96-5	Manganese	3.9	国		P_	
	7440-02-0	Nickel	14.2	וטו		p	
		Potassium	3240				)
		Silver	2.2			p—	
		Sodium	6780			~_	1
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		Vanadium_	24.6	] <del>-</del>		F-	
	7440-66-6	Zinc	28.5	121		P	14
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Color Before: Color After:		Clarity Before:Clarity After:	Texture: Artifacts:
Comments:	<u></u>		275 121,195
		FORM I - IN	SW-846

#### U.S. EPA - CLP

		INORGANIC :	l ANALYSES DATA :	SHEET	EPA SAME	LE NO.
wab Name: QUAN wab Code: ITMO Matrix (soil/w wevel (low/med Solids:	) Case N vater): WATE	R	Contract: 550 SAS No.:	SDG Lab Sample	B0GJY No.: W072 e ID: 938 ived: 09/	1
Co	ncentration	Units (ug	/L or mg/kg dry	y weight)	: UG/L_	
	CAS No.	Analyte	Concentration	C Q	М	
	7440-39-3 7440-41-7 7440-43-9 7440-70-2 7440-47-3 7440-48-4 7440-50-8 7439-89-6 7439-95-4 7439-96-5 7440-02-0 7440-09-7 7440-23-5	Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Magnesium Manganese Nickel Potassium Silver Sodium Vanadium Zinc	24.6 45.9 35.8 0.59 3.1 37100 11.1 4.3 4.7 37.8 10600 4.1 14.2 4330 2.2 7140 23.0 28.3	B U U B U U B U B U B U B U B U B U B U	P	
olor Before: olor After:			ty Before:		Texture: Artifacts	:
omments:	<del> </del>	<u> </u>	,		275	12/195
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#### LOCKHEED ANALYTICAL SERVICES

#### Sample Results

Client Sample ID: BOGJY4	Date Collected: 14-SEP-95
Matrix: Water	Date Received: 16-SEP-95
Percent Solids: N/A	

Constituent	Units		Result	Project: Reporting Limit	Data Qual	Dilution	Date Analyzed		LAS : Sample 10
ALUHINUH, TOTAL	mg/L	6010	0.035	0.029	8	1	16-0CT-95	27912	L5379-2
ANTIMONY, TOTAL	mg/L	6010	< 0.058	0.058	U	1	16-0CT-95	27912	L5379-2
ARSENIC, TOTAL	mg/L	6010	< 0.098	0.098	u	. 1	16-0CT-95	27912	L5379-2.
BARIUM, TOTAL	mg/L	6010	0.030	0.021	В	1	16-OCT-95	27912	L5379-2
BERYLLIUH, TOTAL	ang/L	6010	< 0.0010	0.0010	u	1	16-0CT-95	27912	L5379-2
CADHIUH, TOTAL	mg/L	6010	< 0.0050	0.0050	u	1	16-0CT-95	27912	L5379-2
CALCIUM, TOTAL	mg/L	6010	82.	0.032		1	16-OCT-95	27912	L5379-2
CHROMIUM, TOTAL	mg/L	6010	0.0043	0.0030	8	1	16-0CT-95	27912	L5379-2
COBALT, TOTAL	mg/L	6010	< 0.0060	0.0060	u	1	16-0CT-95	27912	L5379-2
COPPER, TOTAL	mg/L	6010	< 0.0030	0.0030	u	1	16-OCT-95	27912	L5379-2
IRON, TOTAL	mg/L	6010	0.15	0.012		1	16-0CT-95	27912	L5379-2
LEAD, TOTAL	mg/L	6010	< 0.056	0.056	u	1	16-0CT-95	27912	L5379-2
MAGNESIUM, TOTAL	mg/L	6010	17.	0.050		1	16-OCT-95	27912	L5379-2
MANGANESE, TOTAL	mg/L	6010	0.0042	0.0020	8	1	16-0CT-95	27912	L5379-2
NICKEL, TOTAL	mg/L	6010	< 0.015	0.015	u	1	16-0CT-95	27912	L5379-2
POTASSIUM, TOTAL	mg/L	6010	7.4	0.60		1	16-0CT-95	27912	L5379-2
SELENTUH, TOTAL	ang/L	6010	< 0.087	0.087	u	1	16-0CT-95	27912	L5379-2
SILVER, TOTAL	mg/L	6010	< 0.0040	0.0040	u	1	16-0CT-95	27912	L5379-2
SOOTUM, TOTAL	mg/L	6010	150	0.070		1	16-OCT-95	27912	L5379-Z
THALLIUM, TOTAL	ang/L	6010	0.075	0.050	В	1	16-0CT-95	27912	£5379-2
VANADIUH, TOTAL	mg/L	6010	0.0080	0.0040	В	1	16-0CT-95	27912	L5379-2
ZINC, TOTAL	mg/L	6010	0.019	0.0040	Yu	1	16-0CT-95	27912	L5379-2

R72 M14/95



#### LOCKHEED ANALYTICAL SERVICES

#### Sample Results

Client Sample ID: BOGJY5 Date Collected: 14-SEP-95

Matrix: Filt H20 Date Received: 16-SEP-95

Percent Solids: N/A

Constituent	Units	Hethod	Result	Project Reporting Limit	Data Qual	Dilution	Date Analyzed	LAS Batch ID	LAS: : Sample ID
ALUMINUM, DISSOLVED	mg/L	6010	0.039	0.029	8	1	16-0CT-95	27913	L5379-21
ANTIMONY, DISSOLVED	ang/L	6010	< 0.058	0.058	u	1	16-0CT-95	27913	L5379-21
ARSENIC, DISSOLVED	mg/L	6010	< 0.098	0.098	u	1	16-0CT-95	27913	L5379-21
BARIUM, DISSOLVED	mg/L	6010	0.030	0.021	8	1	16-0CT-95	27913	L5379-21
BERYLLIUM, DISSOLVED	mg/L	6010	< 0.0010	0.0010	u	1	16-OCT-95	27913	L5379-21
CADMIUM, DISSOLVED	mg/L	6010	< 0.0050	0.0050	u	1	16-0CT-95	27913	L5379-21
CALCIUM, DISSOLVED	æg/L	6010	90.	0.032		1	16-0CT-95	27913	L5379-21
CHROMIUM, DISSOLVED	mg/L	6010	< 0.0030	0.0030	u	1	16-0CT-95	27913	L5379-21
COBALT, DISSOLVED	mg/L	6010	0.0076	0.0060	В	1	16-0CT-95	27913	L5379-21
COPPER, DISSOLVED	mg/L	6010	< 0.0030	0.0030	u	1	16-0CT-95	27913	L5379-21
IRON, DISSOLVED	mg/L	6010	< 0.012	0.012	u	1	16-0CT-95	27913	L5379-21
LEAD, DISSOLVED	mg/L	6010	< 0.056	0.056	u	1	16-0CT-95	27913	L5379-21
MAGNESIUM, DISSOLVED	mg/L	6010	18.	0.050		1	16-0CT-95	27913	L5379-21
MANGANESE, DISSOLVED	mg/L	6010	< 0.0020	0.0020	u	1	16-0CT-95	27913	L5379-21
NICKEL, DISSOLVED	mg/L	6010	< 0.015	0.015	u	1	16-0CT-95	27913	L5379-21
POTASSIUM, DISSOLVED	mg/L	6010	7.9	0.60		1	16-OCT-95	27913	L5379-21
SELENIUM, DISSOLVED	æg/L	6010	< 0.087	0.087	ч	1	16-0CT-95	27913	L5379-21
SILVER, DISSOLVED	mg/L	6010	< 0.0040	0.0040	u	1	16-0CT-95	27913	L5379-21
SODIUM, DISSOLVED	mg/L	6010	150	0.070		1	16-0CT-95	27913	L5379-21
THALLIUH, DISSOLVED	mg/L	6010	0.089	0.050	В	1	16-0CT-95	27913	L5379-21
VANADIUH, DISSOLVED	mg/L	6010	0.0085	0.0040	В	1	16-oct-95	27913	L5379-21
ZINC, DISSOLVED	mg/L	6010	0.011	0.0040	В	1	16-OCT-95	27913	L5379-21

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# APPENDIX C GENERAL CHEMISTRY DATA SUMMARY TABLES

Project: BECHTEL		RD		Ì																	
Laboratory: Quante	erra			J																	
	SDG: W																				
Sample Number		B0GJS8	_	BOGJS9	_	BOGJT0		BOGJT1		B0GJT2		B0GJT3		BogJVo		B0GJV1		B0GJV8		B0GJV9	
Location		199-N-	-21	199-N-	21	199-N-	25	199-N-	25	199-N-	-26	199-N-	26	199-N-	54	199-N-	-54	199-N-	- 75	199-N-	-75
Remarks				_																	
Sample Date		09/14/95		09/14/95		09/05/95		09/05/95		09/05/95		09/05/95		09/13/95		09/13/95	;	09/12/95		09/12/95	j
General Chemistry	CRDL		Q		œ	Result	Q		Q				Q	Result	Q				Q	Result	Q
Chloride	0.2	21.1		21.4		11.3		11.5		17.4		18.1		23.1		23.5	Γ.	1.32		1,35	
Fluoride	0.1	0.45		0.47		0.30		0.31		0.75		0.73		0.20		0.20		0.14		0.16	
Nitrate-N	0.2	8.59		8.39		2.10		2,17		13.8		14.9		4.93		4.96		1.60	J	1.60	J
Nitrite-N	0.2	0,020	UR	0.020						0.020											
Ortho-Phosphate	0.5	0.50	UR	0.50	UR		UR		UR		UR		UR		UR		UŘ		UR		
Sulfate	0.5	326		325		224		225	L.	149		148		260		254		16.4		16.2	
Spec. Conductivity	N/A			NA		777		NA.		772	L	NA		962		NA.		187		NA	$\Box$
Turbidity	1	1.06	J	NA		0.45		NA		3,85		NA		0.45		NA		0.16	J	NA	
pH	+/-0.05	7.78	7	NA		8,26		NA.		7.92	J	NA		7.34	J	NA		8.15	J	NA	$\Box$
Oil and Grease		0.98		NA		0.95		NA		10.6		NA		0.95	Ų	NA		NA		NA	
TPH		0.48	UR	NA		0.49	UR	NA		0.49	UR	NA		0.48	UR	NA		NA		NA	$\Box$
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Project: BECHTEL-	-HANFO	RD		1																	
Laboratory: Quante	rra .																				
Case	SDG: W	0699																			
Sample Number		<b>BOGJWO</b>		B0GJW1		B0GJW4		B0GJW5		B0GJX4		B0GJX5		B0GJX8		B0GJX9		B0GJY2		B0GJY3	
Location		199-N-	-76	199-N-	76	199-N-	80	199-N-	-80	199-N-	-54	199-N-						199-N-		199-N-	
Remarks										Trip blar		Trip blan		Duplicate		Duplicat		Duplicat		Duplicate	
Sample Date		09/05/95		09/05/95		09/11/95		09/11/95		09/13/95		09/13/95		09/13/95		09/13/95		09/12/95		09/12/95	
General Chemistry	CRDL		Q		Q	Result	Q		Q	Result		Result		Result	Q			Result	Q	Result	
Chloride	0.2	1.23		1.20		2.24		2.33	<u> </u>	0.20		0.20		22.5		23.0		1.27	<u> </u>	1.33	
Fluoride	0.1	0.10		0.11	<u> </u>	0.32		0.33	ļ.,	0.10		0.10		0.20		0.20		0.15		0.16	
Nitrate – N	0.2	1.95		1.93		1.96		1.94		0.28		0.047		4.91		5.00		1.59		1.56	
Nitrite – N	0.2	0.020		0.020		0.020		0.020		0.020											
Ortho-Phosphate	0.5	0,50	UR	0,50	UR		บบ		บป	0.50					UR		UR		UR		UF
Sulfate	0.5	12.2		12.5		48.6		48.7		0.50		0.50	ļυ	255		258	ļ	16.4	<u> </u>	16.2	
Spec. Conductivity	N/A	177		NA		372		NA		100		NA	<u> </u>	969		NA	ļ	186	L	NA	
Turbidity	1	0.82		NA		0.41		NA		0.95		NA	<u> </u>	0,38	_	NA	<u> </u>	0.10		NA	
рH	+/-0.05	8.23	J	NA		7.95	J	NA		5.74	1	NA		7.35		NA	ļ <u>.</u>		J	NA	
Oil and Grease		NA		NA		NA		NA	<u> </u>	2,23		NA		0.98		NA	<u> </u>	NA NA	Ĺ	NA	
TPH		NA		NA		NA NA		NA NA		0.48	UR	NA		0.48	UR	NA		NA	ļ	NA	
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RBC 12/1/95

NA = Not Analyzed, Turbidity (NTU), Specific Conductivity (umhos/cm), pH (pH units)

Project: BECHTEL-	-HANFO	RD		]																	
Laboratory: Quante																					
Case	SDG: V	V0721		<u> </u>								, ×-									
Sample Number		B0GHX7	'	B0GJS7		B0GJV2		B0GJV6		B0GJV7		B0GJW2		B0GJW3		BogJWe	}	B0GJW8		B0GJX0	
Location		199-N-	3	199-N-	-20	199-N-	64	199-N-	70	199-N-	70	199-N-	77	199-N-	77			199-N-	64	199-N-	-20
Remarks								<u> </u>				<u> </u>				EB		EB		EB	
Sample Date		09/15/95	,	09/20/95	<u> </u>	09/20/95	i	09/18/95		09/18/95		09/15/95		09/15/95		09/15/95		09/20/95		09/20/95	
General Chemistry			Q	Result	Q	Result		Result	Q		Q	Result	Q		Q	Result		Result		Result	
Chloride	0.2	30,6		NA.		50.3	<u>-</u>	4.86		4.68		5.85		6.14	_	0,20		0.20		0.20	
Fluoride	0.1	0.20		NA.	<u> </u>	0.23		0.17		0.18		0,67		0.66		0.10		0,10		0.10	
Nitrate-N	0.2	16.4		NA.		14.4		4.30		4.30		0.79		0.81		0.020					
Nitrite-N	0.2	0.020				0.020										0,020					
Ortho-Phosphate	0.5	0.50	UR			0.50	UR		UR		UR		UR		UR						
Sulfate	0.5	143		NA		214		59.4		57.8		340		350		0.50		0.50		0,50	
Spec. Conductivity	N/A	1090		NA		824		314		NA	<u> </u>	1040		NA NA		100		100		100	
Turbidity	1	1.75	J	NA		4.32	j	0.59		NA		0.93		NA		0.95		0.50	_	0.51	
рH	+/-0.05	NA		NA		8.17	J	8.08	J	NA		8.13	J	NA		5.13		5,33	J	5.07	
Oil and Grease		0.94	บ	2.94	Ī	NA		NA		NA		NA		NA		0.99		2.21	L	2.13	
TPH		0.48	UR	0.56	UR	NA		NA		NA .	<u> </u>	NA		NA NA		0.48	UR	0.50	UR	0.50	UR
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RUSC 12/1/85

Project: BECHTEL- Laboratory: Quanter																					
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Case	SDG: W	/0721																			
Sample Number		B0GJX2		B0GJX3		B0GJX6		B0GJY0		B0GJY1											
Location						199-N-				199-N-	70										
Remarks		Trip Blan	ık	Trip Blan	k	Trip Blan	k_	Duplicate	9	Duplicate											
Sample Date		09/15/95		09/15/95		09/20/95		09/18/95		09/18/95											
General Chemistry	CRDL	Result	ď	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chloride	0.2	0.20	ט	0.20		0.20		4.58		4.80	L						<u> </u>		<u> </u>		<u> </u>
Fluoride	0.1	0.10		0.10	U	0.10		0.18		0.19	L				<u> </u>		<u> </u>	<u> </u>	<u> </u>		
Nitrate-N	0.2	0.020		0.020	UR	0,020			j	4.23									<u> </u>		
Nitrite – N	0.2	0.020		0.020													<u> </u>		<u> </u>		L.
Ortho – Phosphate	0.5	0,50		0.50							UR						ł		L		<u> </u>
Sulfate	0.5	0.50	U	0.50	U	0.50		57.6		58.7							<u> </u>		<u> </u>		
Spec. Conductivity	N/A	314		NA		100		100		NA											
Turbidity	1	0.29		NA		0.75		0,29		NA								<u>                                     </u>			
	+/-0.05	5.46		NA		5.16	J	8.10	J	NA NA					<u> </u>						
Oil and Grease		0,95		NA NA		2.63		NA_		NA							<u> </u>				
TPH		0.48	UR	NA.		0.48	UR	NA		NA	<u> </u>										
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XBC 12/1/85

NA = Not Analyzed, EB = Equipment Blank, Turbidity (NTU), Specific Conductivity (umhos/cm), pH (pH units)

Project: BECHTEL-	-HANFO	RD		1																	
Laboratory: Lockhe	ed			1																	
Case	SDG: L	K5379		1																	
Sample Number		B0GJY4		B0GJY5				1													
Location		199-N-	-21	199-N-	21																
Remarks		Split		Split						<u> </u>											
Sample Date		09/14/95	i	09/14/95						<u> </u>			<del>,</del>	<u> </u>				<u> </u>			
General Chemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chloride	0.2	20		20			<u> </u>		<u> </u>	<u> </u>	<u> </u>						<u> </u>	ļ			<u> </u>
Fluoride	0.1	0.1		0.1			<u>L</u>			<u> </u>	<u> </u>							<u> </u>			
Nitrate – N	0.2	8.1		8.3			<u> </u>		L			<u></u>	<u></u>			<u> </u>					L
Nitrite-N	0.2	0.01							<u> </u>		L								L		
Ortho-Phosphate	0.5	0.1	UR		UR		<u> </u>					<u> </u>					<u> </u>				
Sulfate	0.5	300		300			l	<u> </u>							_	<u> </u>			L		
Spec. Conductance	N/A			NA				<u> </u>								<u> </u>	<u> </u>				
Turbidity	1	0.64		NA				<u> </u>	ł								<u> </u>				
	+/-0.05	7.8		NA																	
Oil and Grease		5.00	UA						Ĺ												
TPH		1.00	Ū.	NA_			Ĺ				L					<u> </u>					
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RGC 12/1/85

NA = Not Analyzed, Turbidity (NTU), Specific Conductivity (umhos/cm), pH (pH units)

# APPENDIX D GENERAL CHEMISTRY VALIDATED LABORATORY REPORT FORMS

Project: 550.99

Category: Chloride Method: EPA 300.0 Matrix: LIQUID Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	CAS Kumber	Blank Sample Name	Prep. Analyses Date Date	Result Unit Q	Detectio ual. Limit	n Dil.
BOGJTO	9273-001	Chloride	16887-00-6	QCBLK77766-1	09/11/95 09/11/95	11.3 HG/L	1.00	5
BOGJTO	9273-001DUP	Chloride	16887-00-6	QCBLK77766-1	09/11/95 09/11/95	11.7 HG/L	1.00	5
BOGJTO	92 <b>73-</b> 001HS	Chloride	16887-00-6	QC8LK77766-1	09/11/95 09/11/95	95 %REC		10
BOGJT2	9273-002	Chloride	16887-00-6	QCBLK77766-1	09/11/95 09/11/95	17.4 HG/L	1.00	5
BOG1KO	9273-003	Chloride	16887-00-6	QCBLK77766-1	09/11/95 09/11/95	1.23 HG/L	0.20	1
Bogjui	9273-004	Chloride	16887-00-6	QC8LK77766-1	09/11/95 09/11/95	1.20 HG/L	0.20	1
BOGJT1	9273-005	Chloride	16887-00-6	QCBLK77766-1	09/11/95 09/11/95	11.5 HG/L	1.00	5
BOGJT3	9273-006	Chloride	16887-00-6	QCBLK77766-1	09/11/95 09/11/95	18.1 HG/L	1.00	5
BOGJW4	9319-001	Chloride	16887-00-6	QC8LK78341-1	09/15/95 09/15/95	2.24 HG/L	0.20	1
BOGIN2	9319-002	Chloride	16887-00-6	QCBLK78341-1	09/15/95 09/15/95	2.33 HG/L	0.20	1
BOGJY2	9336-001	Chloride	16887-00-6	QCBLK78546-1	09/19/95 09/19/95	1.27 HG/L	0.20	1
B0G1V8	9336-002	Chloride	16887-00-6	QCBLK78546-1	09/19/95 09/19/95	1.32 HG/L	0.20	1
BOGJAZ	9336-003	Chloride	16887-00-6	QCBLK78546-1	09/19/95 09/19/95	1.33 HG/L	0.20	1
BOGJV9	9336-004	Chloride	16887-00-6	QCBLK78546-1	09/19/95 09/19/95	1.35 HG/L	0.20	1
BOGJX8	9347-001	Chloride	16887-00-6	QC8LK79282-1	09/27/95 09/27/95	22.5 HG/L	1.00	5
BOGJX4	9347-002	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	0.20 HG/L	u <b>0.2</b> 0	1
BOGJVO	9347-003	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	23.1 HG/L	1.00	5
E0GJX5	9347-004	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	0.20 HG/L	u 0.20	1
B0GJX9	9347-005	Chloride	16887-00-6	QC8LK79282-1	09/27/95 09/27/95	23.0 HG/L	1.00	5
BOGJV1	9347-006	Chloride	16887-00-6	QC8LK79282-1	09/27/95 09/27/95	23.5 HG/L	1.00	5
80GJS8	9364-001	Chloride	16887-00-6	QCBLK78809-2	09/22/95 09/22/95	21.1 HG/L	1.00	5
BOGJS9	9364-002	Chloride	16887-00-6	QCBLK78809-2	09/22/95 09/22/95	21.4 HG/L	1.00	5
NA	QCBLK77766-1	Chloride	16887-00-6	QCBLK77766-1	09/11/95 09/11/95	0.20 HG/L	u 0.20	1
NA	QC8LK78341-1	Chloride	16887-00-6	QCBLK78341-1	09/15/95 09/15/95	0.20 HG/L	U 0.20	1
NA	QCBLK78546-1	Chloride	16887-00-6	QCBLK78546-1	09/19/95 09/19/95	0.20 HG/L	ບ 0.20	1
KA	QCBLK78809-2	Chloride	16887-00-6	QCBLK78809-2	09/22/95 09/22/95	0.20 HG/L	u 0.20	1
NA	QCBLK79282-1	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	0.20 HG/L	U 0.20	1
KA	QCLCS77766-1	Chloride	16887-00-6	QCBLK77766-1	09/11/95 09/11/95	93 %REC		1
KA	QCLCS78341-1	Chloride	16887-00-6	QCBLK78341-1	09/15/95 09/15/95	93 %REC		1
NA	QCLCS78546-1	Chloride	16887-00-6	QCBLK78546-1	09/19/95 09/19/95	91 XREC		1
KA	QCLCS78809-3	Chloride	16887-00-6	QCBLK78809-2	09/22/95 09/22/95	95 %REC		1
NA	QCLCS79282-1	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	92 %REC		1

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Project: 550.99

Category: Fluoride Method: EPA 300.0 Matrix: LIQUID Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

BOGJTO         9273-0010UP         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJTO         9273-001KS         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJTZ         9273-002         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJWO         9273-003         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW1         9273-004         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT1         9273-005         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW4         9319-001         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJW5         9319-002         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJY2         9336-001         Fluoride         16984-48-8         QCBLK78546-1         0	09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/15/95 09/15/95 09/15/95 09/19/95	0.30 HG/L 0.30 HG/L 95 %REC 0.75 HG/L 0.10 HG/L 0.11 HG/L 0.31 HG/L 0.32 HG/L 0.33 HG/L 0.34 HG/L 0.15 HG/L 0.14 HG/L	U	0.10 0.10 0.10 0.10 0.10 0.10	1 1 1 1 1 1
BOGJTO         9273-001HS         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJTZ         9273-002         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJWO         9273-003         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW1         9273-004         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT1         9273-005         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT3         9273-006         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW4         9319-001         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJW5         9319-002         Fluoride         16984-48-8         QCBLK78546-1         0           BOGJY2         9336-001         Fluoride         16984-48-8         QCBLK78546-1         0	09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/15/95 09/15/95 09/15/95 09/19/95 09/19/95 09/19/95	95 %REC 0.75 HG/L 0.10 HG/L 0.11 HG/L 0.31 HG/L 0.73 HG/L 0.32 HG/L 0.33 HG/L	U	0.10 0.10 0.10 0.10	1 1 1 1 1
BOGJTZ         9273-002         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJWO         9273-003         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW1         9273-004         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT1         9273-005         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT3         9273-006         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW4         9319-001         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJW5         9319-002         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJY2         9336-001         Fluoride         16984-48-8         QCBLK78546-1         0	09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/15/95 09/15/95 09/15/95 09/15/95 09/19/95 09/19/95	0.75 Hg/L 0.10 Hg/L 0.11 Hg/L 0.31 Hg/L 0.73 Hg/L 0.32 Hg/L 0.33 Hg/L	U	0.10 0.10 0.10 0.10	1 1 1 1
BOGJWO         9273-003         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW1         9273-004         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT1         9273-005         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT3         9273-006         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW4         9319-001         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJW5         9319-002         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJY2         9336-001         Fluoride         16984-48-8         QCBLK78546-1         0	09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/15/95 09/15/95 09/15/95 09/15/95 09/19/95 09/19/95	0.10 HG/L 0.11 HG/L 0.31 HG/L 0.73 HG/L 0.32 HG/L 0.33 HG/L	U	0.10 0.10 0.10 0.10	1 1 1
BOGJW1         9273-004         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT1         9273-005         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT3         9273-006         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW4         9319-001         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJW5         9319-002         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJY2         9336-001         Fluoride         16984-48-8         QCBLK78546-1         0	09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/11/95 09/15/95 09/15/95 09/15/95 09/15/95 09/19/95 09/19/95	0.11 HG/L 0.31 HG/L 0.73 HG/L 0.32 HG/L 0.33 HG/L 0.15 HG/L	U	0.10 0.10 0.10	1 1 1
BOGJT1         9273-005         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJT3         9273-006         Fluoride         16984-48-8         QCBLK77766-1         0           BOGJW4         9319-001         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJW5         9319-002         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJY2         9336-001         Fluoride         16984-48-8         QCBLK78546-1         0	09/11/95 09/11/95 09/11/95 09/11/95 09/15/95 09/15/95 09/15/95 09/15/95 09/19/95 09/19/95	0.31 HG/L 0.73 HG/L 0.32 HG/L 0.33 HG/L 0.15 HG/L		0.10 0.10	1
80GJT3       9273-006       Fluoride       16984-48-8       QCBLK77766-1       0         80GJW4       9319-001       Fluoride       16984-48-8       QCBLK78341-1       0         80GJW5       9319-002       Fluoride       16984-48-8       QCBLK78341-1       0         80GJY2       9336-001       Fluoride       16984-48-8       QCBLK78546-1       0	09/11/95 09/11/95 09/15/95 09/15/95 09/15/95 09/15/95 09/19/95 09/19/95 09/19/95 09/19/95	0.73 HG/L 0.32 HG/L 0.33 HG/L 0.15 HG/L		0.10	1
80GJW4       9319-001       Fluoride       16984-48-8       QCBLK78341-1       0         80GJW5       9319-002       Fluoride       16984-48-8       QCBLK78341-1       0         80GJY2       9336-001       Fluoride       16984-48-8       QCBLK78546-1       0	09/15/95 09/15/95 09/15/95 09/15/95 09/19/95 09/19/95 09/19/95 09/19/95	0.32 HG/L 0.33 HG/L 0.15 HG/L			
BOGJW5         9319-002         Fluoride         16984-48-8         QCBLK78341-1         0           BOGJY2         9336-001         Fluoride         16984-48-8         QCBLK78546-1         0	09/15/95 09/15/95 09/19/95 09/19/95 09/19/95 09/19/95	0. <b>3</b> 3 HG/L 0.15 HG/L		0.10	1
BOGJY2 9336-001 Fluoride 16984-48-8 QCBLK78546-1 0	09/19/95 09/19/95 09/19/95 09/19/95	0.15 HG/L			
	09/19/95 09/19/95			0.10	1
BOGJV8 9336-002 Fluoride 16984-48-8 QCBLK78546-1 C		0.57.4071		0.10	1
		U. 14 MU/L		0.10	1
BOGJY3 9336-003 Fluoride 16984-48-8 QCBLK78546-1 C	09/19/95 09/19/95	0.16 HG/L		0.10	1
BOGJV9 9336-004 Fluoride 16984-48-8 QCBLK78546-1 C	09/19/95 09/19/95	0.16 HG/L		0.10	1
BOGJX8 9347-001 Fluoride 16984-48-8 QCBLK79282-1 C	09/27/95 09/27/95	0.20 KG/L	U	0.20	2
80GJX4 9347-002 Fluoride 16984-48-8 QCBLK79282-1 C	09/27/95 09/27/95	0.10 HG/L	U	0.10	1
BOGJVO 9347-003 Fluoride 16984-48-8 QCBLK79282-1 C	09/27/95 09/27/95	0.20 HG/L	U	0.20	2
BOGJX5 9347-004 Fluoride 16984-48-8 QCBLK79282-1 (	09/27/95 09/27/95	0.10 HG/L	U	0.10	1
BOGJX9 9347-005 Fluoride 16984-48-8 QCBLK79282-1 0	09/27/95 09/27/95	0.20 HG/L	U	0.20	2
E0GJV1 9347-006 Fluoride 16984-48-8 QCBLK79282-1 0	09/27/95 09/27/95	0.20 KG/L	U	0.20	2
BOGJS8 9364-001 Fluoride 16984-48-8 QCBLK78809-2 (	09/22/95 09/22/95	0.45 HG/L		0.20	2
BOGJS9 9364-002 Fluoride 16984-48-8 QCBLK78809-2	09/22/95 09/22/95	0.47 MG/L		0.20	2
NA QCBLK77766-1 Fluoride 16984-48-8 QCBLK77766-1	09/11/95 09/11/95	0.10 MG/L	U	0.10	1
NA QCBLK78341-1 Fluoride 16984-48-8 QCBLK78341-1	09/15/95 09/15/95	0.10 HG/L	ប	0.10	1
NA QCBLK78546-1 Fluoride 16984-48-8 QCBLK78546-1	09/19/95 09/19/95	0.10 HG/L	U	0.10	1
NA QCBLK78809-2 Fluoride 16984-48-8 QCBLK78809-2	09/22/95 09/22/95	0.10 HG/L	U	0.10	1
NA QCBLK79282-1 Fluoride 16984-48-8 QCBLK79282-1	09/27/95 09/27/95	0.10 HG/L	U	0.10	1
NA QCLCS77766-1 Fluoride 16984-48-8 QCBLK77766-1	09/11/95 09/11/95	88 %REC			1
NA QCLCS78341-1 Fluoride 16984-48-8 QCBLK78341-1	09/15/95 09/15/95	99 XREC			1
NA QCLCS78546-1 Fluoride 16984-48-8 QCBLK78546-1	09/19/95 09/19/95	96 %REC			1
NA QCLCS78809-3 Fluoride 16984-48-8 QCBLK78809-2	09/22/95 09/22/95	94 %REC			1
	09/27/95 09/27/95	95 %REC			1

12/1/95 0000120ffe Project: 550.99

Category: Nitrate Method: EPA 300.0 Matrix: LIQUID Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	CAS Humber	Blank Sample Hame	Pr <del>e</del> p. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	n Dil.
BOGJTO	9273-001	Nitrate-N	14797-55-8	QCBLK77766-1	09/11/9	09/11/95	2.10	HG/L	J	0.10	5
BOGJTO	9273-001DUP	Kitrate-N	14797-55-8	QCBLK77766-1	09/11/99	5 09/11/95	2.13	HG/L		0.10	5
BOGJTO	92 <mark>73-</mark> 001HS	Nitrate-N	14797-55-8	QC8LK77766-1	09/11/9	5 09/11/95	104	*REC			5
BOGJT2	9273-002	Nitrate-N	14797-55-8	QCBLK77766-1	09/11/9	5 09/11/95	13.8	HG/L	Ţ	0.40	20
BOGJWO	9273-003	Kitrate-N	14797-55-8	QCBLK77766-1	09/11/9	5 09/11/95	1.95	HG/L		0.10	5
BOGJU1	9273-004	Nitrate-N	14797-55-8	QCBLK77766-1	09/11/9	5 09/11/95	1.93	HG/L	1	0.10	5
BOGJT1	9273-005	Witrate-W	14797-55-8	QCBLK77766-1	09/11/9	5 09/11/95	2.17	HG/L		0.10	5
BOGJT3	9273-006	Kitrate-K	14797-55-8	QCBLK77766-1	09/11/9	5 09/11/95	14.9	HG/L	1	0.40	20
BOGJW4	9319-001	Nitrate-N	14797-55-8	QCBLK78341-1	09/15/9	5 09/15/95	1.96	KG/L		0.10	5
BOGJW5	9319-002	Witrate-W	14797-55-8	QCBLK78341-1	09/15/9	5 09/15/95	1.94	HG/L		0.10	5
B0G1X5	9336-001	Witrate-W	14797-55-8	QCBLK78546-1	09/19/9	5 09/19/95	1.59	HG/L	1	0.040	2
BVLD08	9336-002	Nitrate-N	14797-55-8	QCBLK78546-1	09/19/9	5 09/19/95	1.60	KG/L		0.040	2
BOGJY3	9336-003	Nitrate-H	14797-55-8	QCBLK78546-1	09/19/9	5 09/19/95	1.56	KG/L		0.040	2
BOGJV9	9336-004	Nitrate-X	14797-55-8	QCBLK78546-1	09/19/9	5 09/19/95	1.60	HG/L	{	0.040	2
BOGJX8	9347-001	Kitrate-N	14797-55-8	QC8LK79282-1	09/27/9	5 09/27/95	4.91	l KG/L	1	0.10	5
BOGJX4	9347-002	Hitrate-H	14797-55-8	QCBLK79282-1	09/27/9	5 09/27/95	0.28	3 MG/L	1	0.020	1
B0G1V0	9347-003	Witrate-N	14797-55-8	QCBLK79282-1	09/27/9	5 09/27/95	4.93	S HG/L	1	0.10	5
BOGJX5	9347-004	Nitrate-H	14797-55-8	QCBLK79282-1	09/27/9	5 09/27/95	0.047	7 HG/L	.	0.020	1
BOGJX9	9347-005	Nitrate-N	14797-55-8	QC8LK79282-1	09/27/9	5 09/27/95	5.0	D MG/L	.	0.10	5
BOGJV1	9347-006	Nitrate-N	14797-55-8	QCBLK79282-1	09/27/9	5 09/27/95	4.9	6 HG/L	. [	0.10	5
BOGJS8	9364-001	Nitrate-N	14797-55-8	QCBLK78809-2	09/22/9	5 09/22/95	8.5	9 HG/L	.	0.40	20
80GJS9	9364-002	Kitrate-N	14797-55-8	QCBLK78809-2	09/22/9	5 09/22/95	8.3	9 MG/L	. 🗸	0.40	20
NA	QCBLK77766-1	Nitrate-N	14797-55-8	QCBLK77766-1	09/11/9	5 09/11/95	0.02	O HG/L	. ช	0.020	1
HA	QC8LK78341-1	Nitrate-N	14797-55-8	QCBLK78341-1	09/15/9	5 09/15/95	0.02	O MG/I	. ช	0.020	1
на	QCBLK78546-1	Nitrate-N	14797-55-8	QCBLK78546-1	09/19/9	5 09/19/95	0.02	O NG/I	. ່ປ	0.020	1
АЯ	QCBLK78809-2	Nitrate-N	14797-55-8	QCBLK78809-2	09/22/9	95 09/22/95	0.02	0 HG/1	. U	0.020	1
NĄ	QCBLK79282-1	Nitrate-N	14797-55-8	QCBLK79282-1	09/27/9	95 09/27/95	0.02	0 HG/I	. U	0.020	1
NA	QCLCS77766-1	Hitrate-H	14797-55-8	QCBLK77766-1	09/11/9	95 09/11/95	10	0 %RE	c		1
NA	QCLCS78341-1	Nitrate-H	14797-55-8	QCBLK78341-1	09/15/9	95 09/15/95	9	6 %RE	C		1
HA	QCLCS78546-1	Nitrate-H	14797-55-8	QCBLK78546-1	09/19/	95 09/19/95	\$	6 %RE	C		1
NA	QCLCS78809-3	Nitrate-N	14797-55-8	QCBLK78809-2	09/22/	95 09/22/95	\$	8 %RE	C		1
NA	QCLCS79282-1	Hitrate-H	14797-55-8	3 QCBLK79282-1	09/27/	95 09/27/95	10	O XRE	C		1

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Project: 550.99

Category: Nitrite Method: EPA 300.0 Matrix: LIQUID

Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

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Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Analyses Date Date	Result Unit	Qual.	Detection Limit	Dit.
BOGJTO	9273-001	Nitrite-N	14797-65-0	QC8LK77766-1	09/11/95 09/11/95	0.020 MG/L	<b>। (</b> र	0.020	1
BOGJTO	9273-0010UP	Hitrite-H	14797-65-0	QCBLK77766-1	09/11/95 09/11/95	0.020 HG/L	IJ	0.020	1
BOGJTO	9273-001HS	Kitrite-N	14797-65-0	QCBLK77766-1	09/11/95 09/11/95	91 %REC			5
BOGJT2	9273-002	Hitrite-H	14797-65-0	QC8LK77766-1	09/11/95 09/11/95	0.020 MG/L	υR	0.020	1
BOGJWO	9273-003	Hitrite-N	14797-65-0	QCBLK77766-1	09/11/95 09/11/95	0.020 MG/L	n (K	0.020	1
Bog1r1	9273-004	Nitrite-N	14797-65-0	QCBLK77766-1	09/11/95 09/11/95	0.020 HG/L	υR	0.020	1
80GJT1	9273-005	Kitrite-N	14797-65-0	QC8LK77766-1	09/11/95 09/11/95	0.020 MG/L	uR	0.020	1
BOGJT3	9273-006	Hitrite-N	14797-65-0	QCBLK77766-1	09/11/95 09/11/95	0.020 HG/L	UR	0.020	1
B0GJW4	9319-001	Nitrite-N	14797-65-0	QCBLK78341-1	09/15/95 09/15/95	0.020 HG/L	υJ	0.020	1
B0GJW5	9319-002	Hitrite-N	14797-65-0	QC8LK78341-1	09/15/95 09/15/95	0.020 HG/L	υJ	0.020	1
BOGJY2	9336-001	Nitrite-N	14797-65-0	QC8LK78546-1	09/19/95 09/19/95	0.020 MG/L	uR	0.020	1
BOG1A8	9336-002	Nitrite-N	14797-65-0	QCBLK78546-1	09/19/95 09/19/95	0.020 MG/L	υR	0.020	1
BOGJY3	9336-003	Nitrite-N	14 <b>79</b> 7-65-0	QCBLK78546-1	09/19/95 09/19/95	0.020 MG/L	ngs	0.020	1
BOGJV9	9336-004	Nitrite-N	14797-65-0	QCBLK78546-1	09/19/95 09/19/95	0.020 MG/L	uR	0.020	1
BOGJX8	9347-001	Nitrite-H	14797-65-0	QCBLK79282-1	09/27/95 09/27/95	0.020 MG/L	uR	0.020	1
BOGJX4	9347-002	Nitrite-N	14797-65-0	QC8LK79282-1	09/27/95 09/27/95	0.020 MG/L	UR	0.020	1
BOGTAO	9347-003	Nitrite-N	14 <b>79</b> 7-65-0	QC8LK79282-1	09/27/95 09/27/95	0.020 MG/L	u R	0.020	1
BOGJX5	9347-004	Hitrite-N	14 <b>7</b> 97-65 <b>-</b> 0	QC8LK79282-1	09/27/95 09/27/95	0.020 MG/L	UR	0.020	1
E0G1X5	9347-005	Nitrite-N	14797-65-0	QC8LK79295-1	09/28/95 09/28/95	0.020 HG/L	UR	0.020	1
BOGJV1	9347-006	Kitrite-K	14797-65-0	QC8LK79295-1	09/28/95 09/28/95	0.020 MG/L	UR	0.020	1
BOGJS8	9364-001	Nitrite-N	14797-65-0	QCBLK78809-2	09/22/95 09/22/95	0.020 HG/L	u R	0.020	1
80G1S9	9364-002	Nitrite-N	14797-65-0	QCBLK78809-2	09/22/95 09/22/95	0.020 HG/L	υQ	0.020	1
NA	QCBLK77766-1	Nitrite-N	14797-65-0	QC8LK77766-1	09/11/95 09/11/95	0.020 HG/L	U	0.020	1
HA	QCBLK78341-1	Nitrite-N	14797-65-0	QCBLK78341-1	09/15/95 09/15/95	0.020 HG/L	U	0.020	1
NA	QCBLK78546-1	Nitrite-N	14797-65-0	QCBLK78546-1	09/19/95 09/19/95	0.020 HG/L	ប	0.020	1
NA	QC8LK78809-2	Nitrite-N	14797-65-0	QCBLK78809-2	09/22/95 09/22/95	0.020 HG/L	U	0.020	1
NA	QCBLK79282-1	Nitrite-N	14797-65-0	QC8LK79282-1	09/27/95 09/27/95	0.020 HG/L	U	0.020	1
NA	QC8LK79295-1	Nitrite-N	14797-65-0	QCBLK79295-1	09/28/95 09/28/95	0.020 HG/L	U	0.020	1
NA	QCLCS77766-1	Nitrite-N	14797-65-0	QC8LK77766-1	09/11/95 09/11/95	101 %REC	;		1
RA	QCLCS78341-1	Nitrite-N	14797-65-0	QCBLK78341-1	09/15/95 09/15/95	95 %REC	;		1
NA	QCLCS78546-1	Hitrite-N	14797-65-0	QC8LK78546-1	09/19/95 09/19/95	92 %REC	:		1
NA	QCLCS78809-3	Nitrite-N	14797-65-0	QC8LK78809-2	09/22/95 09/22/95	94 %REC	;		1

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Project: 550.99

Category: Witrite Method: EPA 300.0 Matrix: LIQUID Sample Date : NA Receipt Date : NA Report Date : 10/19/95

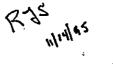
Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Analyses Date Date	Result Unit Q	Detection ual. Limit Dil.
NA	QCLCS79282-1	Nitrite-N	14797-65-0	QC8LK79282-1	09/27/95 09/27/95	94 XREC	1
HA	QCLCS79295-1	Hitrite-H	14797-65-0	QCBLK79295-1	09/28/95 09/28/95	89 XREC	1

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Project: 550.99

Category: Orthophosphate Hethod: EPA-300.0 Matrix: LIQUID Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	CAS Number	8lank Sample Name	Prep. Date	Analyses Date	Result	Unit		etection Limit	n Dil.
BOGJTO	9273-001	Ortho-Phosphate	14265-44-2	QCBLK78341-1	09/15/95	09/15/95	0.50	HG/L	NUR	0.50	1
BOGJTO	9273-001DUP	Ortho-Phosphate	14265-44-2	QCBLK78341-1	09/15/95	09/15/95	0.50	HG/L	บ	0.50	1
BOG1TO	9273-001MS	Ortho-Phosphate	14265-44-2	QCBLK78341-1	09/15/95	09/15/95	100	#REC			1
BOGJTZ	9273-002	Ortho-Phosphate	14265-44-2	QCBLK78341-1	09/15/95	09/15/95	0.50	HG/L	KUR	0.50	1
BOGJWO	9273-003	Ortho-Phosphate	14265-44-2	QC8LK78341-1	09/15/95	09/15/95		HG/L	YUK	0.50	1
B0G1H1	9273-004	Ortho-Phosphate	14265-44-2	QC8LK78341-1	09/15/95	09/15/95	0.50	HG/L	N UK	0.50	1
BOGJT1	9273-005	Ortho-Phosphate	14265-44-2	QCBLK78341-1	09/15/95	09/15/95	0.50	HG/L	NUR	0.50	1
BOGJT3	9273-006	Ortho-Phosphate	14265-44-2	QCBLK78341-1	09/15/95	09/15/95		HG/L	JUN		1
BOGJW4	9319-001	Ortho-Phosphate	14265-44-2	QCBLK78341-1	09/15/95	09/15/95	0.50	HG/L	· 707		1
BOGJUS	9319-002	Ortho-Phosphate	14265-44-2	QC8LK78341-1	09/15/99	09/15/95	0.50	HG/L	N02	0.50	1
B0GJY2	9336-001	Ortho-Phosphate	14265-44-2	QCBLK78546-1	09/19/95	09/19/95	0.50	HG/L	NUR	0.50	1
BOG1V8	9336-002	Ortho-Phosphate	14265-44-2	QC8LK78546-1	09/19/99	09/19/95	0.50	HG/L	& UR	0.50	1
E0G1X3	9336-003	Ortho-Phosphate	14265-44-2	QC8LK78546-1	09/19/95	09/19/95	0.50	HG/L	y UR	0.50	1
BOGJV9	9336-004	Ortho-Phosphate	14265-44-2	QC8LK78546-1	09/19/99	09/19/95	0.50	HG/L	<b>XUR</b>	0.50	1
80GJX8	9347-001	Ortho-Phosphate	14265-44-2	QC8LK79282-1	09/27/99	09/27/95	0.50	HG/L	yur	0.50	1
80GJX4	9347-002	Ortho-Phosphate	14265-44-2	QCBLK79282-1	09/27/99	09/27/95	0.50	MG/L	yur	0.50	1
8001/0	9347-003	Ortho-Phosphate	14265-44-2	QCBLK79282-1	09/27/99	09/27/95	0.50	HG/L	yur	0.50	1
BOGJX5	9347-004	Ortho-Phosphate	14265-44-2	QCBLK79282-1	09/27/99	09/27/95	0.50	HG/L	yur	0.50	1
B0GJX9	9347-005	Ortho-Phosphate	14265-44-2	QCBLK79282-1	09/27/95	09/27/95	0.50	HG/L	YUR	0.50	1
BOGJV1	9347-006	Ortho-Phosphate	14265-44-2	QCBLK79282-1	09/27/99	09/27/95	0.50	O MG/L	your	0.50	1
82LD08	9364-001	Ortho-Phosphate	14265-44-2	QC8LK78809-2	09/22/99	09/22/95	0.50	O HG/L	BUR	0.50	1
80GJS9	9364-002	Ortho-Phosphate	14265-44-2	QCBLK78809-2	09/22/99	5 09/22/95	0.5	O HG/L	YUR	0.50	1
NA	QCBLK78341-1	Ortho-Phosphate	14265-44-2	QC8LK78341-1	09/15/99	5 09/15/95	0.5	0 MG/L	ប	0.50	1
HA	QCBLK78546-1	Ortho-Phosphate	14265-44-2	QCBLK78546-1	09/19/9	5 09/19/95	0.5	O MG/L	U	0.50	1
NA	QCBLK78809-2	Ortho-Phosphate	e 14265-44-2	QCBLK78809-2	09/22/9	5 09/22/95	0.5	O MG/L	υ	0.50	1
NA	QCBLK79282-1	Ortho-Phosphate	14265-44-2	QC8LK79282-1	09/27/9	5 09/27/95	0.5	O HG/L	ប	0.50	1
NA	QCLC\$78341-1	Ortho-Phosphato	e 14265-44-2	QCBLK78341-1	09/15/9	5 09/15/95	11	2 XREC			1
<b>NA</b>	QCLCS78546-1	Ortho-Phosphat	e 14265-44-2	QCBLK78546-1	09/19/9	5 09/19/95	10	3 XREC			1
NA	QCLCS78809-3	Ortho-Phosphat	e 14265-44-2	QC8LK78809-2	09/22/9	5 09/22/95	9	6 XREC			1
NA	QCLCS79282-1	Ortho-Phosphate	e 14265-44-2	QC8LK79282-1	09/27/9	5 09/27/95	10	2 XREC	:		1



Project: 550.99

Category: Sulfate Method: EPA 300.0 Matrix: LIQUID Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Analyses Date Date	Result Unit	Qual.	Detection Limit	n Dil.
BOGJTO	9273-001	Sulfate	14808-79-8	QC8LK77766-1	09/11/95 09/11/95	224 MG/L		10.0	20
BOGJTO	9273-001DUP	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	223 HG/L		10.0	20
BOGJTO	9273-001MS	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	60 %REC			20
BOGJT2	9273-002	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	149 HG/L		10.0	20
80GJW0	9273-003	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	12.2 HG/L		0.50	1
BOGJW1	9273-004	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	12.5 HG/L		0.50	1
BOGJT1	<b>9273-0</b> 05	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	225 HG/L		10:0	20
BOGJT3	9273-006	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	148 HG/L		10.0	20
BOGJW4	9319-001	Sulfate	14808-79-8	QCBLK78341-1	09/15/95 09/15/95	48.6 MG/L		2.50	5
80GJW5	9319-002	Sulfate	14808-79-8	QCBLK78341-1	09/15/95 09/15/95	48.7 HG/L		2.50	5
BOGJY2	9336-001	Sulfate	14808-79-8	QCBLK78546-1	09/19/95 09/19/95	16.4 HG/L		0.50	1
80CJV8	9336-002	Sulfate	14808-79-8	QCBLK78546-1	09/19/95 09/19/95	16.4 HG/L		0.50	1
BOGJY3	9336-003	Sulfate	14808-79-8	QCBLK78546-1	09/19/95 09/19/95	16.2 HG/L		0.50	1
E0G1A&	9336-004	Sulfate	14808-79-8	QCBLK78546-1	09/19/95 09/19/95	16.2 HG/L		0.50	1
B0GJX8	9347-001	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	255 HG/L		10.0	20
BOGJX4	9347-002	Sulfate	14808-79-8	QC8LK79282-1	09/27/95 09/27/95	0.50 MG/L	U	0.50	1
BOGJV0	9347-003	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	260 MG/L		10.0	20
BOGJX5	9347-004	Sulfate	14808-79-8	QC8LK79282-1	09/27/95 09/27/95	0.50 MG/L	U	0.50	1
80GJX9	9347-005	Sulfate	14808-79-8	QC8LK79282-1	09/27/95 09/27/95	258 MG/L		10.0	20
BOGJV1	9347-006	Sulfate	14808-79-8	QC8LK79282-1	09/27/95 09/27/95	254 MG/L		10.0	20
B0GJS8	9364-001	Sulfate	14808-79-8	QCBLK78809-2	09/22/95 09/22/95	326 MG/L		10.0	20
BOG125	9364-002	Sulfate	14808-79-8	QCBLK78809-2	09/22/95 09/22/95	325 HG/L		10.0	20
NA	QCBLK77766-1	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	0.50 MG/L	ប	0.50	1
NA	QCBLK78341-1	Sulfate	14808-79-8	QCBLK78341-1	09/15/95 09/15/95	0.50 KG/L	U	0.50	1
NA	QCBLK78546-1	Sulfate	14808-79-8	QC8LK78546-1	09/19/95 09/19/95	0.50 MG/L	U	0.50	1
NA 1	QCBLK78809-2	Sulfate	14808-79-8	QCBLK78809-2	09/22/95 09/22/95	0.50 MG/L	U	0.50	1
NA	QCBLK79282-1	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	0.50 HG/L	U	0.50	1
NA	QCLCS77766-1	Sulfate	14808-79-8	QCBLK77766-1	09/11/95 09/11/95	92 %REC			1
NA	QCLCS78341-1	Sulfate	14808-79-8	QCBLK78341-1	09/15/95 09/15/95	94 %REC			1
NA	QCLCS78546-1	Sulfate	14808-79-8	QC8LK78546-1	09/19/95 09/19/95	92 %REC			1
NA	QCLCS78809-3	Sulfate	14808-79-8	QC8LK78809-2	09/22/95 09/22/95	92 %REC			1
NA	QCLCS79282-1	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	93 %REC			1

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Project: 550.99

Category: Conductivity EPA 120.1 Method: EPA 120.1 Matrix: LIQUID

Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit Qual.	Detection Limit	oit.
BOGITO	9273-001	Specific Conduc	C-011	QC8LK77923-1	09/13/9	5 09/13/95	777	UMHOS/CH	100	1
BOGJTO	92 <b>73-0</b> 010UP	Specific Conduc	C-011	QCBLK77923-1	09/13/9	5 09/13/95	778	UHHOS/CH	100	1
BOGJT2	9273-002	Specific Conduc	C-011	QCBLK77923-1	09/13/9	5 09/13/95	772	UNHOS/CH	100	1
BOGJWO	9273-003	Specific Conduc	C-011	QCBLK77923-1	09/13/9	5 09/13/95	177	UHHOS/CH	100	1
BOGJU4	9319-001	Specific Conduc	C-011	QCBLK78781-1	09/25/9	5 09/25/95	372	UNHOS/CH	100	1
80GJY2	9336-001	Specific Conduc	C-011	QC8LK78781-1	09/25/9	5 09/25/95	186	UNHOS/CH	100	1
8VLD08	9336-002	Specific Conduc	C-011	QC8LK78781-1	09/25/9	5 09/25/95	187	UNHOS/CH	·100	1
BOGJX8	9347-001	Specific Conduc	C-011	QC8LK78781-1	09/25/9	5 09/25/95	969	UHHOS/CH	100	1
BOGJX4	9347-002	Specific Conduc	C-011	QCBLK78781-1	09/25/9	5 09/25/95	100	UHHOS/CH U	100	1
BOGJVO	9347-003	Specific Conduc	C-011	QCBLK78781-1	09/25/9	5 09/25/95	962	UNHOS/CH	100	1
80GJS8	9364-001	Specific Conduc	c-011	QCBLK78781-1	09/25/9	5 09/25/95	1090	UMHOS/CH	100	1
KA	QCBLK77923-1	Specific Conduc	C-011	QC8LK77923-1	09/13/9	5 09/13/95	100	UNHOS/CH U	100	1
NA	QC8LK78781-1	Specific Conduc	C-011	QCBLK78781-1	09/25/9	5 09/25/95	100	UNHOS/CH U	100	1

Ph/29/95

Project: 550.99

Category: Oil & Grease EPA 413.1 Nethod: EPA 413.1

Matrix: LIQUID

Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result t	Unit	Qual.	Detection Limit	n Dil.
BOGITO	9273-001	Oil & Grease	C-007	QCBLK77768-1	09/12/9	5 09/12/95	0.95	MG/L	U	0.95	1
BOGJTO	9273-001DUP	Oil & Grease	c-007	QCBLK77768-1	09/12/9	5 09/12/95	0.98 (	NG/L	ប	0.98	1
BOGJT2	9273-002	Oil & Grease	C-007	QCBLK77768-1	09/12/9	5 09/12/95	10.6	MG/L		0.94	1
BOGJX8	9347-001	Oil & Grease	C-007	QCBLK78647-1	09/21/9	5 09/21/95	0.98	KG/L	U	0.98	1
BOGJX4	9347-002	Oil & Grease	c-007	QCBLK78647-1	09/21/9	5 09/21/95	2.23	HG/L		0.93	1
B0G1V0	9347-003	Oil & Grease	C-007	QCBLK78647-1	69/21/9	5 09/21/95	0.95	KG/L	U	0.95	1
BOGJS8	9364-001	OIL & Grease	C-007	QCBLK78647-1	09/21/9	5 09/21/95	0.98	KG/L	ប	0.78	1
КА	QCBLK77768-1	Oil & Grease	C-007	QCBLK77768-1	09/12/9	5 09/12/95	1.00	HG/L	บ	1.00	1
NA	QCBLK78647-1	Oil & Grease	C-007	QCBLK78647-1	09/21/9	5 09/21/95	1.00	KG/L	U	1.00	1
NA	QCLCS77768-1	Off & Grease	C-007	QCBLK77768-1	09/12/9	5 09/12/95	113	XREC			1
HA	QCLCS78647-1	Off & Grease	C-007	QCBLK78647-1	09/21/9	5 09/21/95	94	XREC			1

11/14/95 11/14/95

Project: 550.99

Category: pH EPA 9040 Hethod: EPA 9040 Hatrix: LIQUID Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	'CAS Number	Blank Sample Name	Prep. Analyses Date Date	Result Unit Qual.	Detection Limit Dil.
BOGJTO	9273-001	pil	C-006	QC8LX77585-1	09/08/95 09/08/95	8.26 PH J	1
BOGJTO	9273-0010UP	pli	C-006	QCBLK77585-1	09/08/95 09/08/95	8.27 PH	1
BOGJTZ	9273-002	pll	c-006	QCBLK77585-1	09/08/95 09/08/95	7-92 PH 3	1
80GJ10	9273-003	pli	c-006	QCBLK77585-1	09/08/95 09/08/95	8-23 PH J	1
BOGJW4	9319-001	płł	c-006	QCBLK78098-1	09/15/95 09/15/95	7.95 PH J	1
BOGJY2	9336-001	рłł	c-006	QCBLK78098-1	09/15/95 09/15/95	8.15 PH J	1
BOGJV8	9336-002	pii	c-006	QCBLK78098-1	09/15/95 09/15/95	8.15 PH J	1
BOGJX8	9347-001	pli	c-006	QCBLK78368-1	09/19/95 09/19/95	7.35 PH J	1
B0GJX4	9347-002	р#	c-006	QCBLK78368-1	09/19/95 09/19/95	5.74 PH J	1
BOGJVO	9347-003	płł	c-006	QCBLK78368-1	09/19/95 09/19/95	7.34 PH J	1
BOGJS8	9364-001	pli	c-006	QC8LK78368-1	09/19/95 09/19/95	7.78 PH J	1
HA	QC8LK77585-1	pil	c-006	QCBLX77585-1	09/08/95 09/08/95	5.65 PH	•
HA	QC8LK78098-1	pli	c-006	QC8LK78098-1	09/15/95 09/15/95	5.54 PH	
NA	QCBLK78368-1	p#l	c-006	QCBLK78368-1	09/19/95 09/19/95	5.16 PH	

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Project: 550.99

Category: TPH EPA 418.1 Method: EPA 418.1 Matrix: LIQUID

Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dit.
BOGJTO	9273-001	TPH	10-90-2	QC8LK77946-1	09/13/99	09/14/95	0.49	MG/L	υR	0.49	1
BOGJTO	9273-001MS	TPH	10-90-2	QCBLK77946-1	09/13/9	09/14/95	81	XREC			1
BOGITO	9273-001HSD	TPH	10-90-2	QCBLK77946-1	09/13/99	09/14/95	80	<b>X</b> REC			1
BOGJT2	9273-002	TPH	10-90-2	QC8LK77946-1	09/13/99	09/14/95	0.49	MG/L	υR	0.49	1
BOGJX8	9347-001	TPH	10-90-2	QCBLK78908-1	09/26/9	09/27/95	0.48	HG/L	UR	0.48	1
BOGJX4	9347-002	TPH	10-90-2	QCBLK78908-1	09/26/99	09/27/95	0.48	HG/L	υR	0.48	1
BOG1AO	9347-003	TPH	10-90-2	QC8LK78908-1	09/26/99	69/27/95	0.48	HG/L	υR	0:48	1
B0GJS8	9364-001	TPH	10-90-2	QCBLK78908-1	09/26/95	09/27/95	0.48	MG/L	u (2	0.48	1
NA	QCBLK77946-1	TPH	10-90-2	QCBLK77946-1	09/13/99	6 09/14/95	0.50	MG/L	ย	0.50	1
HA	QCBLK78908-1	TPH	10-90-2	QCBLK78908-1	09/26/9	5 09/27/95	0.50	KG/L	U	0.50	1
NA	QCLCS77946-1	TPH	10-90-2	QC8LK77946-1	09/13/99	5 09/14/95	93	*REC			1
NA	QCLCS78908-1	TPH	10-90-2	QCBLK78908-1	09/26/9	5 09/27/95	89	<b>X</b> REC			1

12/1/15 0050129CM

Project: 550.99

Category: Turbidity EPA 180.1 Hethod: EPA 180.1 Hatrix: LIQUID

Sample Date : 09/05/95 Receipt Date : 09/06/95 Report Date : 10/19/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Analyses Date Date	Result Unit Qual.	Detection Limit D	oil.
BOGJTO	9273-001	Turbidity	G-019	QC8LK77698-1	09/11/95 09/11/95	0.45 NTU J	0.01	1
OTLD08	9273-001DUP	Turbidity	G-019	QC8LK77698-1	09/11/95 09/11/95	0.44 NTU	0.01	1
80GJT2	9273-002	Turbidity	G-019	QC8LK77698-1	09/11/95 09/11/95	3.85 NTU J	0.01	1
8061M0	9273-003	Turbidity	G-019	QCBLK77698-1	09/11/95 09/11/95	0.82 HTU J	0.01	1
BOGJW4	9319-001	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	0.41 NTU J	0.61	1
BOGJYZ	9336-001	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	U UTH 01.0	0.01	1
80GJV8	9336-002	Turbidity	G-019	QC8LK78789-1	09/25/95 09/25/95	0.16 NTU J	0±01	1
BOGJX8	9347-001	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	O.38 NTU J	0.01	1
BOGJX4	9347-002	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	0.95 ити Ј	0.01	1
BOCIVO	9347-003	Turbidity	G-019	QC8LK78789-1	09/25/95 09/25/95	0.45 NTU J	0.01	1
BOGJS8	9364-001	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	1.06 HTU U	0.01	1
NA	QCBLK77698-1	Turbidity	G-019	QCBLK77698-1	09/11/95 09/11/95	0.01 NTU	0.01	1
NA	QCBLK78789-1	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	0.03 NTU	0.01	1

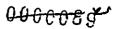
PSC 12/1/85

Project: 550.99

Category: Chloride Hethod: EPA 300.0 Hatrix: LIQUID Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

Client ID	Quanterra ID	Analyte	CAS Humber	Blank Sample Name	Prep. Analyses Date Date	Result Unit	Qual.	Detection Limit	oit.
BOGIKA	9375-001	Chloride	16887-00-6	QC8LK78923-1	09/25/95 09/25/95	0.20 KG/L	Ų	0.20	1
8001146	9375-001DUP	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	0.20 HG/L	ប	0.20	ī
9NCD08	9375-001HS	Chloride	16887-00-6	QCBLK78923-1	<b>09/25/9</b> 5 <b>09/25/9</b> 5	99 XREC			5
BOGJX2	9375-002	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	0.20 HG/L	ប	0.20	1
BOGHX7	9375-003	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	30.6 HG/L		5.00	25
BOC1MS	9375-004	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	5.85 KG/L		0.40	2
BOGJV3	9375-005	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	6.14 HG/L		0:40	2
BOGJX3	9375-007	Chloride	16887-00-6	QCBLK78923-2	09/25/95 09/25/95	0.20 KG/L	ឋ	0.20	1
BOGJV6	9380-001	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	4.86 HG/L		1.00	5
0YLD08	9380-002	Chloride	16887-00-6	QC8LK78923-1	09/25/95 09/25/95	4.58 HG/L		1.00	5
BOGJV7	9380-003	Chloride	16887-00-6	QC8LK78923-1	09/25/95 09/25/95	4.68 HG/L		1.00	5
BOGJY1	9380-004	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	4.80 HG/L		1.00	5
80C1K8	9404-001	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	0.20 HG/L	ូម	0.20	1
B0C1XQ	9404-002	Chloride	16887-00-6	QC8LK79282-1	09/27/95 09/27/95	0.20 KG/L	U	0.20	1
BOGJXO	9404-003	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	0.20 HG/L	U	0.20	1
BOCIAS	9404-004	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	50.3 HG/L		5.00	25
HA	QCBLK78923-1	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	0.20 HG/L	ប	0.20	1
на	QCBLK78923-2	Chloride	16887-00-6	QCBLK78923-2	09/25/95 09/25/95	0.20 KG/L	ប	0.20	1
на	QCBLK79282-1	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	0.20 KG/L	ប	0.20	1
на	QCLCS78923-1	Chloride	16887-00-6	QCBLK78923-1	09/25/95 09/25/95	93 TREC			1
НА	QCLCS78923+2	Chloride	16887-00-6	QCBLK78923-2	09/25/95 09/25/95	93 TREC			1
НА	QCLCS79282-1	Chloride	16887-00-6	QCBLK79282-1	09/27/95 09/27/95	92 TREC			1

8-92 12141 es

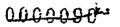


Project: 550.99

Category: Fluoride Hethod: EPA 300.0 Hatrix: LIQUID Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

Client ID	Quanterra 19	Analyte	CAS Number	Blank Sample Hame	Prep. Analyses Date Date	Result Unit	Qual.	Detection Limit	oil.
BOGJKS	9375-001	Fluoride	16984-48-8	QC8LK78923-1	09/25/95 09/25/95	0.10 HG/L	U	0.10	1
									1
9NLD08	9375-001DUP	Fluoride	16984-48-8	QC8LK78923-1	09/25/95 09/25/95	0.10 KG/L	ប	0.10	-
9NF508	9375-001KS	Fluoride	16984-48-8	QC8LK78923-1	09/25/95 09/25/95	92 <b>%</b> REC			1
SXLDOB	9375-002	Fluoride	16984-48-8	QC8LK78923-1	09/25/95 '09/25/95	8.10 MG/L	บ	0.10	1
EOGHX7	9375-003	Fluoride	16984-48-8	QCBLK78923-1	09/25/95 09/25/95	0.20 HG/L	U	0.20	2
80GJW2	9375-004	Fluoride	16984-48-8	QCBLK78923-1	09/25/95 09/25/95	0.67 HG/L		0.20	2
E0GJV3	9375-005	Fluoride	16984-48-8	QCBLK78923-1	09/25/95 09/25/95	0.66 MG/L		. 0220	2
80G1X3	9375-007	Fluoride	16984-48-8	QC8LK78923-2	09/25/95 09/25/95	0.10 HG/L	U	0.10	1
80G1V6	9380-001	Fluoride	16984-48-8	QCBLK78923-1	09/25/95 09/25/95	0.17 HG/L		0.10	1
OYLDOB	9380-002	Fluoride	16984-48-8	QC8LK78923-1	09/25/95 09/25/95	0.18 MG/L		0.10	1
BOGJV7	9380-003	Fluoride	16984-48-8	QC8LK78923-1	09/25/95 09/25/95	0.18 KG/L		0.10	1
EOGJY1	9380-004	fluoride	16984-48-8	QCBLK78923-1	09/25/95 09/25/95	0.19 HG/L		0.10	1
BULDOE	9404-001	Fluoride	16984-48-8	QC8LK79282-1	09/27/95 89/27/95	0.10 HG/L	U	0.10	1
9XLD08	9404-002	Fluoride	16984-48-8	QCBLK79282-1	09/27/95 09/27/95	0.10 HG/L	ឋ	0.10	1
BOGJX0	9404-003	Fluoride	16984-48-8	QCBLK79282-1	09/27/95 09/27/95	0.10 HG/L	บ	0.10	1
BOGJVZ	9404-004	fluoride	16984-48-8	QCBLK79282-1	09/27/95 09/27/95	0.23 HG/L		0.10	1
NA	QC8LK78923-1	Fluoride	16984-48-8	QCBLK78923-1	09/25/95 09/25/95	0.10 HG/L	ឋ	0.10	1
АИ	QC8LK78923-2	Fluoride	<b>16984-</b> 48-8	QCBLK78923-2	09/25/95 09/25/95	0.10 HG/L	ឋ	0.10	1
на	QCBLK79282-1	Fluoride	16984-48-8	QCBLK79282-1	09/27/95 09/27/95	0.10 KG/L	ប	0.10	1
на	QCLCS78923-1	Fluoride	16984-48-8	QCBLK78923-1	09/25/95 09/25/95	96 ≭REC			1
HA	QCLCS78923-2	Fluoride	16984-48-8	QC8LK78923-2	09/25/95 09/25/95	93 *REC			1
NA	QCLCS79282-1	fluoride	16984-48-8	OCBLK79282-1	09/27/95 09/27/95	95 <b>%</b> REC			1

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Project: 550.99

Category: Hitrate Hethod: EPA 300.0 Hatrix: LIQUID Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

	<u> </u>								
Client ID	Quanterra ID	Analyte	CAS Humber	Blank Sample Kame	Prep. Analyses Date Date	Result Unit		tection Limit	Dil.
BOGJW6	9375-001	Witrate-H	14797-55-8	QC8LK78923-1	09/25/95 09/25/95	0.020 HG/L	ROB	0.020	1
80GJK6	9375-0010UP	Hitrate-H	14797-55-8	QCBLK78923-1	09/25/95 09/25/95	0.020 HG/L	ប	0.020	1
BOGJW6	9375-001HS	Mitrate-M	14797-55-8	QCBLK78923-1	09/25/95 09/25/95	100 XREC			5
BOG1X2	9375-002	Hitrate-H	14797-55-8	QC8LK78923-1	09/25/95 09/25/95	0.020 HG/L	NUR	0.020	1
BOGKX7	9375-003	Hitrate-H	14797-55-8	QC8LK78923-1	09/25/95 09/25/95	16.4 KG/L	<b>T</b>	0.50	25
B0GJW2	9375-004	Hitrate-H	14797-55-8	QC8LK78923-1	09/25/95 09/25/95	0.79 KG/L	7	0.020	1
E0GJU3	9375-005	Kitrate-H	14797-55-8	QC8LK78923-1	09/25/95 09/25/95	0.81 KG/L	7	0-020	1
BOGJX3	9375-007	Hitrate-H	14797-55-8	QC8LK78923-2	09/25/95 09/25/95	0.020 HG/L	JS ∪ R	0.020	1
9Ar508	9380-001	Hitrate-H	14797-55-8	QCBLK78923-1	09/25/95 09/25/95	4.30 KG/L	J	0.10	5
OYLDOB	9380-002	Hitrate-H	14797-55-8	QC8LK78923-1	09/25/95 09/25/95	4.26 HG/L	J	0.10	5
BOGJV7	9380-003	Hitrate-H	14797-55-8	QCBLK78923-1	09/25/95 09/25/95	4.30 KG/L	J	0.10	5
EOGJY1	9380-004	Hitrate-H	14797-55-8	QC8LK78923-1	09/25/95 09/25/95	4.23 HG/L	J	0.10	5
BUGJUB	9404-001	Hitrate-H	14797-55-8	QCBLK79282-1	09/27/95 09/27/95	0.020 KG/L	& UR	0.020	1
80GJX6	9404-002	Witrate-W	14797-55-8	QC8LK79282-1	09/27/95 09/27/95	0.020 KG/L	NUR	0.020	1
BOG1XO	9404-003	Witrate-W	14797-55-8	QC8LK79282-1	09/27/95 09/27/95	0.020 HG/L	& UR	0.020	1
SVL008	9404-004	Hitrate-H	14797-55-8	QC8LK79282-1	09/27/95 09/27/95	14.4 HG/L	<u>J</u>	0.50	25
HA	QC8LK78923-1	Hitrate-H	14797-55-8	QC8LK78923-1	09/25/95 09/25/95	0.020 HG/L	U	0.020	1
HA	OC8LK78923-2	Witrate-W	14797-55-8	QC8LK78923-2	09/25/95 09/25/95	0.020 HG/L	ប	0.020	1
KA .	QCBLK79282-1	Hitrate-N	14797-55-8	QC8LK79282-1	09/27/95 09/27/95	0.020 HG/L	U	0.020	1
на	QCLCS78923-1	Hitrate-H	14797-55-8	QCBLK78923-1	09/25/95 09/25/95	101 TREC			1
NA	QCLCS78923-2	Hitrate-H	14797-55-8	qc8LK78923-2	09/25/95 09/25/95	103 %REC			1
NA	QCLCS79282-1	Kitrate-K	14797-55-8	QC8LK79282-1	09/27/95 09/27/95	100 TREC			1

RS5 14/95

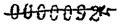
Project: 550.99

Category: Witrite Hethod: EPA 300.0 Matrix: LIQUID Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

Client ID	Quanterra ID	Amalyte	CAS Number	Blank Sample Hame	Prep. Analyses Date Date	Result Unit		etection Limit	DīL.
900100	9375-001	Kitrite-H	14797-65-0	QC8LK78923-1	09/25/95 09/25/95	0.020 HG/L	NO K	0.020	1
80 <b>61n</b> 6	9375-001DUP	Kitrite-K	14797-65-0	QCBLK78923-1	09/25/95 09/25/95	0.020 KG/L	ប	0.020	1
BOGING	9375-001KS	Hitrite-H	14797-65-0	QCBLK78923-1	09/25/95 09/25/95	92 %REC			5
EOGIXS	9375-002	Hitrite-H	14797-65-0	QC8LK78923-1	09/25/95 09/25/95	8.020 KG/L	& UR	0.020	1
BOGHX7	9375-003	Kitrite-H	14797-65-0	QCBLK78923-1	09/25/95 09/25/95	0.020 KG/L	& UR	0.020	i
BOCTICS	9375-004	Hitrite-H	14797-65-0	QCBLK78923-1	09/25/95 09/25/95	0.020 KG/L	& UR	0.020	1
B0C1N3	9375~005	Kitrite-K	14797-65-0	QC8LK78923-1	09/25/95 09/25/95	0.020 HG/L	A UR	0.020	1
80 <b>C1</b> X3	9375-007	Kitrite-K	14797-65-0	QC8LK78923-2	09/25/95 09/25/95	0.020 HG/L	as or	0.020	1
BOGJV6	9380-001	Kitrite-H	14797-65-0	QCBLK78923-1	09/25/95 09/25/95	0.020 KG/L	& OR	0.020	1
BOGJYO	9380-002	Kitrite-K	14797-65-0	QCBLK78923-1	09/25/95 09/25/95	0.020 KG/L	A OR	0.020	1
BOGJV7	9380-003	Hitrite-H	14797-65-0	QCBLK78923-1	09/25/95 09/25/95	0.020 KG/L	y UR	0.020	1
E0GJY1	9380-004	Hitrite-H	14797-65-0	QC8LK78923-1	09/25/95 09/25/95	0.020 HG/L	& UR	0.020	1
BOGJUB	9404-001	Kitrite-K	14797-65-0	QC8LK79282-1	09/27/95 09/27/95	0.020 HG/L	A OK	0.020	1
BOG1X6	9404-002	Hitrite-H	14797-65-0	QCBLK79282-1	09/27/95 09/27/95	0.020 HG/L	y ur	0.020	1
B0C1X0	9404-003	Kitrite-N	14797-65-0	QCBLK79282-1	09/27/95 09/27/95	0.020 HG/L	& UK	0.020	1
SVL208	9404-104	Hitrite-H	14797-65-0	QC8LK79Z82-1	09/27/95 09/27/95	0.020 HG/L	2 UR	0.020	1
HA	QCBLK78923-1	Kitrite-K	14797-65-0	QCBLK78923-1	09/25/95 09/25/95	0.020 HG/L	υ	0.020	1
НА	QCBLK78923-2	Kitrite-K	14797-65-0	QCBLX78923-2	09/25/95 09/25/95	0.020 HG/L	ប	0.020	1
на	QC8LK79282-1	Nitrite-N	14797-65-0	QCBLK79282-1	09/27/95 09/27/95	0.020 HG/L	ប	0.020	1
НA	QCLCS78923-1	Hitrite-H	14797-65-0	QC81 K78923-1	09/25/95 09/25/95	92 %REC			1
на	QCLC\$78923-2	Hitrite-H	14797-65-0	QC8LK78923-2	09/25/95 09/25/95	95 XREC			1
HA	QCLCS79282-1	Hitrite-H	14797-65-0	QCBLK79282-1	09/27/95 09/27/95	94 %REC			1

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Project: 550.99

Category: Orthophosphate Hethod: EPA 300.0 Hatrix: LIQUID Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

Client ID	Quanterra 10	Analyte CAS H	Blank Sample umber Hame	Prep. Analyses Date Date	Result Unit		etection Limit	n Dil.
60GJW6	9375-001	Ortho-Phosphate 14265		09/25/95 09/25/95	0.50 KG/L	N UR	0.50	1
		•						1
BOCIKS	9375-001DUP	Ortho-Phosphate 14265	·44-2 QCBLK78923-1	09/25/95 09/25/95	0.50 KG/L	U	0.50	-
9NF908	9375-001KS	Ortho-Phosphate 14265	-44-2 qcsLK78923-1	09/25/95 09/25/95	104 #REC			1
E0GJX2	9375-002	Ortho-Phosphate 14265-	-44-2 QCBLK78923-1	09/25/95 09/25/95	0.50 KG/L	DUR	0.50	1
BOGHX7	9375-003	Ortho-Phosphate 14265	-44-2 QCBLK78923-1	09/25/95 09/25/95	0.50 HG/L	y ur	0.50	1
BOGJWZ	9375-004	Ortho-Phosphate 14265-	-44-2 QCBLK78923-1	09/25/95 09/25/95	0.50 KG/L	Ø UR	0.50	1
ENLO08	9375-005	Ortho-Phosphate 14265	-44-2 QCBLX78923-1	09/25/95 09/25/95	0.50 KG/L	s ur	0.50	1
BOG1X3	9375-007	Ortho-Phosphate 14265-	-44-2 QC8LK78923-2	09/25/95 09/25/95	0.50 KG/L	ಶ ೮೪	0.50	1
B0GJV6	9380-001	Ortho-Phosphate 14265-	44-2 QC8LK78923-1	09/25/95 09/25/95	0.50 KG/L	y ur	0.50	1
BOGJYO	9380-002	Ortho-Phosphate 14265-	-44-2 QCBLK78923-1	09/25/95 09/25/95	0.50 MG/L	& UR	0.50	1
80GJV7	9380-003	Ortho-Phosphate 14265-	44-2 QC8LK78923-1	09/25/95 09/25/95	0.50 KG/L	b ur	0.50	1
BOGJY1	9380-004	Ortho-Phosphate 14265-	-44-2 QCBLK78923-1	09/25/95 09/25/95	0.50 HG/L	A OF	0.50	1
BOGJW8	9404-001	Ortho-Phosphate 14265-	44-2 QCBLK79282-1	09/27/95 09/27/95	0.50 HG/L	6 OR	0.50	1
BOGJX6	9404-002	Ortho-Phosphate 14265-	44-2 QCBLK79282-1	09/27/95 09/27/95	0.50 HG/L	& uk	0.50	1
EOCIXO	9404-003	Ortho-Phosphate 14265	-44-2 QCBLK79282-1	09/27/95 09/27/95	0.50 KG/L	<b>४ ७</b> ९	0.50	1
BOGJAS	9404-004	Ortho-Phosphate 14265-	-44-2 QCBLK79282-1	09/27/95 09/27/95	0.50 KG/L	y ua	0.50	1
на	QC8LK78923-1	Ortho-Phosphate 14265	-44-2 QCBLK78923-1	09/25/95 09/25/95	0.50 HG/L	ប	0.50	1
HA	QC8LK78923-2	Ortho-Phosphate 14265	-44-2 QCBLK78923-2	09/25/95 09/25/95	0.50 KG/L	ប	0.50	1
HA	QCBLK79Z82-1	Ortho-Phosphate 14265	-44-2 QCBLK79282-1	09/27/95 09/27/95	0.50 KG/L	ប	0.50	1
на	QCLCS78923-1	Ortho-Phosphate 14265	-44-2 QCBLK78923-1	09/25/95 09/25/95	104 XREC	-		1
₩A	QCLCS78923-2	Ortho-Phosphate 14265	-44-2 QCBLK78923-2	09/25/95 09/25/95	96 XREC			1
HA.	QCLCS7928Z-1	Ortho-Phosphate 14265		09/27/95 09/27/95	102 %REC			1

RES WHOS

Project: 550.99

Category: Sulfate Method: EPA 300.0 Matrix: LIQUID Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Analyses Date Date	Result Uni	t Qual.	Detection Limit	n Dil.
806146	9375-001	Sulfate	14808-79-8	QC8LK78923-1	09/25/95 09/25/95	0.50 HG/	L U	0.50	1
BOGTRE	9375-0010UP	Sulfate	14808-79-8	QCBLK78923-1	09/25/95 09/25/95	0.50 KG/	L U	0.50	1
9NE DOB	9375-001KS	Sulfate	14808-79-8	QCBLK78923-1	09/25/95 09/25/95	98 #RE	c		5
80GJX2	9375-002	Sulfate	14808-79-8	QCBLK78923-1	09/25/95 09/25/95	0.50 KG/	L, U	0.50	1
BOGKX7	9375-003	Sulfate	14808-79-8	QC8LK78923-1	09/25/95 09/25/95	143 HG/	L	12.5	25
80G1ft5	9375-004	Sulfate	14808-79-8	QCBLK78923-1	09/25/95 09/25/95	340 HG/	L	25.0	50
80 <b>GJU</b> 3	9375-005	Sulfate	14808-79-8	QCBLK78923-1	09/25/95 09/25/95	350 KG/	L	- 25.0	50
80C1X3	9375-007	Sulfate	14808-79-8	QCBLK78923-2	09/25/95 09/25/95	0.50 HG/	ב ט	0.50	1
90CJV6	9380-001	Sulfate	14808-79-8	QC8LK78923-1	09/25/95 09/25/95	59.4 HG/	L	2.50	5
OYLDOB	9380-002	Sulfate	14808-79-8	QCBLX78923-1	09/25/95 09/25/95	57.6 HG/	L	2.50	5
BOGJV7	9380-003	Sulfate	14808-79-8	QCBLK78923-1	09/25/95 09/25/95	57.8 HG/	L	2.50	5
BOGJY1	9380-004	Sulfate	14808-79-8	QC8LK78923-1	09/25/95 09/25/95	58.7 HG/	L	2.50	5
800168	9404-001	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	0.50 KG/	ב ט	0.50	1
BOGJX6	9404-002	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	0.50 KG/	ב ט	0.50	1
OXL203	9404-003	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	0.50 KG/	נ ט	0.50	1
E0GJV2	9404-004	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	214 HG/	L	12.5	25
HA	QC8LK78923-1	Sulfate	14808-79-8	QCBLK78923-1	09/25/95 09/25/95	0.50 HG/	ι υ	0.50	1
АН	QCBLK78923-2	Sulfate	14808-79-8	QC8LK78923-2	09/25/95 09/25/95	0.50 HG/	L U	0.50	1
на	QCBLK79282-1	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	0.50 HG/	ע ט	0.50	1
NA	QCLCS78923-1	Sulfate	14808-79-8	QCBLK78923-1	09/25/95 09/25/95	95 %RE	c		1
на	QCLCS78923-2	Sulfate	14808-79-8	QC8LK78923-2	09/25/95 09/25/95	91 <b>%</b> RE	c		1
NA	QCLCS79282-1	Sulfate	14808-79-8	QCBLK79282-1	09/27/95 09/27/95	93 <b>%</b> RE	:c		1

R92,314/02

Project: 550.99

Category: Conductivity EPA 120.1 Hethod: EPA 120.1 Hatrix: LIQUID

Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/27/95

Client ID	Quanterra IO	Analyte	CAS Number	Blank Sample Hame	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGJU6	9375-001	Specific Conduc	C-011	QCBLK78781-1	09/25/95	09/25/95	100	UMHOS	/CH U	100	1
90CJN9	9375-001DUP	Specific Conduc	C-011	QC8LK78781-1	09/25/95	09/25/95	100	UMHOS	/כא ט	100	1
BOGJX2	9375-002	Specific Conduc	C-011	QCBLK78781-1	09/25/99	09/25/95	314	UMROS	/CH	100	1
BOGHX7	9375-003	Specific Conduc	C-011	QC8LK78781-1	09/25/95	09/25/95	1090	UHHOS	/CH	100	1
SULDOB	9375-004	Specific Conduc	C-011	QC8LK78781-1	09/25/95	09/25/95	1040	UHKOS	/CH	100	1
BOGJV6	9380-001	Specific Conduc	C-011	QC8LK78781-1	09/25/95	09/25/95	314	UHHOS	/CH	100	1
BOGJYO -	9380-002	Specific Conduc	C-011	QCBLK78781-1	09/25/95	09/25/95	100	UMHOS	עכא ט	· <del></del> 100	1
BULDOB	9404-001	Specific Conduc	C-011	QC8LK80386-1	10/13/95	10/13/95	100	UHHOS	/CH U	100	1
80G1X6	9404-002	Specific Conduc	C-011	QCBLK80386-1	10/13/95	10/13/95	100	UHHOS	/CH U	100	1
80GJX0	9404-003	Specific Conduc	C-011	QC8LK80386-1	10/13/99	10/13/95	100	UHHOS.	CH U	100	1
BOGJVZ	9404-004	Specific Conduc	C-011	QC8LK80386-1	10/13/95	10/13/95	824	UHHOS	/CH	100	1
на	QCBLK78781-1	Specific Conduc	C-011	QCBLK78781-1	09/25/95	09/25/95	100	LHHOS	CH U	100	1
NA	QCBLK80386-1	Specific Conduc	C-011	QCBLK80386-1	10/13/95	10/13/95	100	UMHOS.	∖c∺ ń	100	1

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Project: 550.99

Category: Oil & Grease EPA 413.1 Method: EPA 413.1 Matrix: LIQUID

Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/27/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Hame	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	n Dil.
BOGJU6	9375-001	Oil & Grease	C-007	QC8LK79628-1	10/04/95	10/04/95	0.99	HG/L	Ü	0.99	1
80 <b>GJ</b> ¥6	9375-0010UP	Oil & Grease	c-007	QCBLK79628-1	10/04/95	10/04/95	0.97	HG/L	ប	0.97	1
SXLD08	9375-002	Oil & Grease	c-007	QCBLX79628-1	10/04/95	10/04/95	0.95	HG/L	U	0.95	1
BOGHX7	9375-003	Oil & Grease	C-007	QC8LK79628-1	10/04/95	10/04/95	0.94	HG/L	บ	0.94	1
BOGINS	9404-001	Oil & Grease	c-007	QCBLK80549-1	10/16/95	10/16/95	2.21	HG/L		1.00	1
B0G1X6	9404-002	Oil & Grease	c-007	QCBLK80549-1	10/16/95	10/16/95	2.63	KG/L		0.94	1
BOGIXO	9404-003	Oîl & Grease	c-007	QCELK80549-1	10/16/95	10/16/95	2.13	KG/L		1.02	1
BOGJS7	9404-005	Oil & Grease	c-007	QCBLK80549-1	10/16/95	10/16/95	2.94	KG/L		1.18	1
НA	QCBLK79628-1	Oil & Grease	c-007	QCBLK79628-1	10/04/99	10/04/95	1.00	HG/L	ប	1.00	1
₩A	QCBLK80549-1	Oil & Grease	c-007	QC8LK80549-1	10/16/95	10/16/95	1.00	HG/L	U	1.00	1
HA	QCLCS79628-1	Oil & Grease	c-007	QC8LK79628-1	10/04/99	10/04/95	87	******************			1
НА	QCLCS80549-1	Oil & Grease	c-007	QCBLK80549-1	10/16/95	10/16/95	93	#REC			1

Project: 550.99

Category: pH EPA 9040 Hethod: EPA 9040 Hatrix: LIQUID Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

Client ID	Quanterra 1D	Analyte	CAS Kumber	Blank Sample Name		lyses ate	Result	Unit	Qual.	Detection Limit	oil.
80G1M9	9375-001	pH	C-006	QCBLK78766-1	09/25/95 09/	/25/95	5.13	PH	J		1
BOG1K6	9375-0010UP	pH	C-006	QCBLK78766-1	09/25/95 09/	/25/95	5.18	PH			1
BOGJXZ	9375-002	рll	C-006	QCBLK78766-1	09/25/95 09/	/25/95	5.46	PH	J		1
BOGJU2	9375-004	рН	C-006	QCBLK78766-1	09/25/95 09/	/25/95	8.13	PH T	5		1
80GJV6	9380-001	₽H	C-006	QCBLK78766-1	09/25/95 09/	/25/95	8.08	PH J	-		1
BOGJYO	9380-002	рĦ	C-006	QCBLK78766-1	09/25/95 09/	/25/95	8.10	PH J	i		1
80 <b>G</b> JW8	9404-001	рH	C-806	QCBLK78861-1	09/26/95 09/	/26/95	5.33	PH J	•	<del>.</del>	1
BOGJX6	9404-002	рЩ	C-006	QCBLK78861-1	09/26/95 09/	/26/95	5.16	PH J	•		1
BOGJX0	9404-003	рĦ	C-006	QCBLK78861-1	09/26/95 09/	/26/95	5.07	PH J	-		1
80C1AS	9404-004	рĦ	C-006	QC8LK78861-1	09/26/95 09/	/26/95	8.17	PH .	5		1
KA	QCBLK78766-1	рH	C-006	QC8LK78766-1	09/25/95 09/	/25/95	5.30	PH			1
HA	QCBLK78861-1	рH	c-006	QCBLK78861-1	09/26/95 09/	/26/95	5.21	PH			1

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Project: 550.99

Category: TPH EPA 418.1 Method: EPA 418.1 Hatrix: LIQUID

Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

Client ID	Quanterra ID	Analyte	CAS Humber	Blank Sample Name	Prep. Date	Analyses Date	Result Unit		Detection Limit	Dil.
BOGJK6	9375-001	TPH	10-90-2	QC8LK78908-1	09/26/9	5 09/27/95	0.48 HG/L	υR	0.48	1
80GJW6	9375-001HS	TPH	10-90-2	QCBLK78908-1	09/26/9	5 09/27/95	82 XREC			1
BOGJW6	9375-001KSD	ТРН	10- <del>9</del> 0-2	QC8LK78908-1	09/26/9	5 09/27/95	82 #REC			1
80GJX2	9375-002	TPK	10-90-2	QC8LK78908-1	09/26/9	5 09/27/95	0.48 HG/L	UR	0.48	1
BOGHX7	9375-003	TPH	10-90-2	QCBLK78908-1	09/26/9	5 09/27/95	0.48 HG/L	UR	0.48	1
806148	9404-001	TPK	10-90-2	QCBLK78908-1	09/26/9	5 09/27/95	0.50 HG/L	uR	0.50	1
BOGJX6	9404-002	TPH	10-90-2	QC8LK78908-1	09/26/9	5 09/27/95	0.48 MG/L	UR	0.48	1
80GJX0	9404-003	TPK	10-90-2	QCBLK78908-1	09/26/9	5 09/27/95	0.50 KG/L	u R	0.50	1
BOGJS7	9404-005	ТРН	10-90-2	QCBLK78908-1	09/26/9	5 09/27/95	0.56 HG/L	uR	0.56	1
HA	QC8LK78908-1	TPH	10-90-2	QCBLX78908-1	09/26/9	5 09/27/95	0.50 HG/L	U	0.50	1
HA	QCLCS78908-1	TPH	10-90-2	QCBLK78908-1	09/26/9	5 09/27/95	89 XREC			1

R35 214195

Project: 550.99

Category: Turbidity EPA 180.1 Hethod: EPA 180.1 Hatrix: LIQUID

Sample Date : 09/15/95 Receipt Date : 09/18/95 Report Date : 10/26/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Hame	Prep. Analyses Date Date	Result Unit Qual.	Detection Limit	oil.
BOGJNQ	9375-001	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	0.95 HTU J	0.01	1
941508	9375-001DUP	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	0.93 NTU	0.01	1
BOGJX2	9375-002	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	UTH 85.0	0.01	1
BOGHX7	9375-003	Turbidity	G-019	QC8LK78789-1	09/25/95 09/25/95	1.75 HTU J	0.01	1
80GJW2	9375-004	Turbidity	G-019	QC8LK78789-1	09/25/95 09/25/95	0.93 нти Ј	0.01	1
BOGJV6 *	9380-001	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	0.59 HTU J	0.01	1
OYLDDB	9380-002	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	UTH 95.0	. 0:01	1
8ULD08	9404-001	Turbidity	G-019	QCBLK81228-1	10/23/95 10/23/95	0.50 RTU J	0.01	1
9XLD08	9404-002	Turbidity	G-019	QCBLK81228-1	10/23/95 10/23/95	0.75 HTU J	0.01	1
E0C1X0	9404-003	Turbidity	G-019	QCBLK81228-1	10/23/95 10/23/95	0.51 HTU J	0.01	1
B0GJV2	9404-004	Turbidity	G-019	QCBLK81228-1	10/23/95 10/23/95	4.32 HTU J	0.01	1
на	QC8LK78789-1	Turbidity	G-019	QCBLK78789-1	09/25/95 09/25/95	0.03 HTU	0.01	1
на	QCBLK81228-1	Turbidity	G-019	QCBLK81228-1	10/23/95 10/23/95	0. <b>07</b> NTU	0.01	1

Ky2"4102

#### COMMON IONS AND ADDITIONAL ANALYTES

#### Sample Results

Client Sample ID: BOGJY4	Date Collected: 14-SEP-95
Matrix: Water	Date Received: 16-SEP-95

Constituent	Units	Method	Resul t	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch   ID	: LAS Samole ID:
Specific Conductance	us/cm	120.1	1100	1		26-SEP-95	27575	L5379-9
Turbidity	טזא	180.1	0.64	H/A	NJ	23-SEP-95	27708	L5379-10
Chloride	mg/L	300.0	20.	0.02		20-SEP-95	27576	L5379-3
Fluoride	mg/L	300.0	< 0.1	0.1	U	20-SEP-95	27578	L5379-3
Nitrate-N	ng/L	300.0	8.1	0.02	NJ	20-SEP-95	27580	L5379-3
Nitrite-N	mg/L	300.0	< 0.01	0.01	JY UR	20-SEP-95	27582	L5379-3
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	FUR	20-SEP-95	27584	L5379-3
Sulfate	mg/L	300.0	300	1	D(1:10)	20-SEP-95	27586	L5379-3
Н	pH Units	9040	7.8	0.1	XJ	22-SEP-95	27656	L5379-11

ZZZ "IHI95

OIL AND GREASE - GRAVIMETRIC METHOD 413.1 OIL AND GREASE

> Client Sample ID: Date Collected:

Date Analyzed:

BOGJY4 14-SEP-95

28-SEP-95

Matrix: QC Group: Water

413.1 OIL AND GREASE\_27944

LAL Sample ID:

L5379-4 16~SEP-95 Date Received: Date Extracted: 28-SEP-95

Analytical Batch ID: 092895-413.1

Dilution Factor: 1

DATA QUALIFIER(E) PRACTICAL result Quantifation liket CONSTITUENT mg/L mg/L

Total Oil and Grease

5.00

TOTAL PETROLEUM HYDROCARBONS BY FTIR 418.1 TPH

Client Sample ID:

BOGJY4 14-SEP-95

Date Collected: Date Analyzed:

26-SEP-95

Matrix: QC Group: Water 418.1 TPH 27753 LAL Sample ID:

L5379-8

Date Received:

16-SEP-95

Date Extracted: 25-SEP-95

Analytical Batch ID: 092695-418.1

Dilution Factor: 1

PRACTICAL DATA RESULT QUANTITATION LIMIT QUALIFIER(&) CONSTITUENT

TRPH

<1.00 U

RJS 1114195

#### COMMON IONS AND ADDITIONAL ANALYTES

#### Sample Results

Client Sample ID: BOGJY5	Date Collected: 14-SEP-95
Matrix: Filt H20	Date Received: 16-SEP-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch   ID	LAS Sample ID
Chloride	tng/L	300.0	20.	0.02		20-SEP-95	27577	L5379-22
Fluoride	mg/L	300.0	< 0.1	0.1	J	20-SEP-95	27579	L5379-22
Nitrate-N	mg/L	300.0	8.3	0.02	JY J	20-SEP-95	27581	L5379-22
Nitrite-N	mg/L	300.0	< 0.01	0.01	XUR	20-SEP-95	27583	L5379-22
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	MUR	20-SEP-95	27585	L5379-22
Sulfate	mg/L	300.0	300	1	D(1:10)	20-SEP-95	27587	L5379-22

RJS/1/14/as

# APPENDIX E RADIOCHEMISTRY DATA SUMMARY TABLES

Project: BECHTEL-HAN	FORD			1																	
Laboratory: QES				1																	
	SDG: V	V0699																			
Sample Number		<b>BOGJTO</b>		B0GJT2		B0GJW0		B0GJW4		B0GJY2		B0GJV8		B0GJX8		B0GJX4		B0GJV0		B0GJS8	
Location		199-N-	-25	199-N-	26	199-N-	76	199-N-	80	199-N-	75	199-N-	-75	199-N-	54			199-N-	-54	199-N-	·21
Remarks										Duplicate				Duplicat		Trip Blai					
Sample Date		09/05/95		09/05/95		09/05/95		09/11/95		09/12/95		09/12/95		09/13/95		09/13/9		09/13/95		09/14/95	
Radiochemistry Analysis	CRDL	Result	Q	Result	Q			Result	Q	Result		Result						Result		Result	Q
Gross Alpha		4.24		2.01		0.00	U	3.57			U	0.298	U	1.44	U	-0.050		1.63	U	3.30	Ш
Gross Beta	8	4.20		5,59		185	Ĺ.	6,86		1380		1390		825	<u> </u>	1.72		813	<u> </u>	10.9	
Strontium	5	-0.048	υ		υ	85.3	<u> </u>	0.293	U_	682		678		399		0.114	U_	394	<u> </u>		U
Tritium	500	1030	J		J	67800	J	42200	J	61800	J	61900	J	6170	J	8.18		6550	J		J
Co-58	20	-0.0009		-0.0038		6.38	U	-4.38		0.00	U	-2.74	U	6.76	U	-0.0748		-3.66	U		U
Co-60	20	-0.0033		-0.0028		-0.509	U	2.58	บ	1.88		7.76	υ	2.72		2.50	U	3.34	U		U
Cs-137		0.00175		-6.27E-05		3.17	U		U		U	-0.314	U	1.31		3.93	U	2.41	U		U
Eu-152	20	0.00528	U	-0.0003		1.39	U	2.57	บ			6.79	U	-2.70		0.694	U	6.82	U		U
Eu-154	20	0.00554	U	-0.0011	U	-3.67	U			11.2	U	-1.59	U	0.00		14.9	U	-16.7	U		U
Eu-155	20	0.00542	U	-0.0003	J	-2.48	U	0.956	U	-4.44		1.63	U	4.15	ប	-4.49	U	4.05	U		U
Fe-59	20	-0.0094	U	0.0104	U	-6.43	υ	11.7	U	-12.7	Ų	3.88	U	3.01	U	0.00	U	1.28	U	-3.54	U
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Project: BECHTEL-HAN	FORD			1																	
Laboratory: QES			-	1																	
Case	SDG: V	V0721		]																	
Sample Number		BOGJW6	;	B0GJX2		B0GHX7	•	B0GJW2		B0GJV6		B0GJY0		B0GJW8		B0GJX6		B0GJX0		B0GJV2	
Location						199-N-	-3	199-N-	77	199-N-	70	199-N-	70	199-N-	64	199-N-			-20	199-N-	-64
Remarks		EB		Trip Blan	k							Duplicate		EB		Trip Blan		EB		<u> </u>	
Sample Date		09/15/95	5	09/15/95	i	09/15/95		09/15/95		09/18/95	i	09/18/95		09/20/95		09/20/95		09/20/95		09/20/95	
Radiochemistry Analysis		Result				Result	Q	Result	Q	Result			Q	Result							
Gross Alpha		0.420	U		U	NA			υ	1 - 1 - 1 - 1	U		U		U	-0.0302	_	0.121		5,64	J
Gross Beta		2.79		1.68	U	NA		6.63		6.08		6.84		-0.0547		1.58	۵	1.95	U	10.9	<u> </u>
Strontium			U	-0.0013		952	L				U				U	-0.0427		0.0900	U	0.0795	U
Tritium		65.8		46.2		20900	J		J	32200	J	33000	J	105		67.8		47.7		12700	J
Co58			U			0.774	υ		ᅴ				C	-3.55	U	-4.32	U	2.84	U	1.31	U
Co60					اد	-2.05	υ		٦		ᅴ		C	-0.285			U	4.17	U	5.48	U
Cs-137		2.26			۵	5.48	U		٥		ט			2.52		2.32	U	5.77	U	-2.79	U
Eu-152	20	0.614	U	1	U	-9.76	٥	1.76			υ		U_	-4.30	_	8.65	U	-1.55	U	-5.35	U
Eu-154	20	0.754	U	1 ,	U	3.94	U	4.62			ט	10.3	U	-7.96	U	***		9.65	U	-8.31	U
Eu-155	20	-2.31	U .	9,88	ט	3,53	U	4.02	υ		U		C		Ü			3.97	U	-2.45	U
Fe-59	20	4.13	U	5.85	Ü	-9.43	U	5,02	υ	1.93	U	1.39	U	2.64	U	-9.90	U	13.7	U	-4.68	U
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Project: BECHTEL-HAN	IFORD			]																	
Laboratory: Lockheed				1																	
Case	SDG: L	K5379		1																	
Sample Number		B0GJY4				<u> </u>						T						T		<del> </del>	
Location		199-N-	-21							<del>                                     </del>								1		<del>                                     </del>	-
Remarks		Split										<u> </u>									
Sample Date		09/14/95	5															†	····		
Radiochemistry Analysis	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	TQ
Gross Alpha	4	1.80	U					<u> </u>			Ī								T		
Gross Beta	8								I								1				
Tritium	500	1360				L													1		
Ac-228(Ra-228)	20		Ū																Τ		
Co-58	20	2,50						l													
Co60	20	-0.5					$\Box$				$\Box$						1	1	T		
Cs-137	20	4.1															i —		$\vdash$		
Eu-152	20	4				<u> </u>		l									1				
Eu-154	20	-6.7															1		T		
Eu-155	20		Ū				Π														
Fe-59	20	-1.3															<b> </b>				П
Pb-212	20	4.7	U																		$\Box$
Pb-214(Ra-226)	20	-3.5																			
Ra-226(Gamma)	20	-110.0					$\Gamma$										ļ —	<u> </u>			
Ru-106	20	-20.00	U																		
U-235(Gamma)	20	-5.0													_						
Strontium	5	0.67	U															T			
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## APPENDIX F RADIOCHEMISTRY VALIDATED LABORATORY REPORT FORMS



LAB NAME:

ITAS-RICHLAND

SDG:

W0699

LAB SAMPLE ID:

50906101

**MATRIX:** 

WATER

CLIENT ID:

**BOGJTO** 

DATE RECEIVED:

9/6/95 9:15:00 AM

 ISOTOPE		COUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER	
 							D00040	
CO-58	-8.90E-04 U	4.9E-03	4.9E-03	8.68E-03	pCi/L	N/A	RD3219	
CO-60	-3.33E-03 U	4.6E-03	4.6E-03	7.44E-03	pCi/L	N/A	RD3219	
CS-137DA	1.75E-03 U	5.3E-03	5.3E-03	9.77E-03	p <b>Ci/L</b>	N/A	RD3219	
EU-152	5.28E-03 <i>U</i>	1.2E-02	1.2E-02	2.24E-02	pCI/L	N/A	RD3219	
EU-154	5.54E-03 U	1.3E-02	1.3E-02	2.65E-02	p <b>Ci/L</b>	N/A	RD3219	
EU-155	5.42E-03 U	1.0E-02	1.0E-02	1.82E-02	pCi/L	N/A	RD3219	
FE-59	-9.42E-03 U	1.2E-02	1.2E-02	1.97E-02	pCi/L	N/A	RD3219	
ALPHA	4.24E+00	2.2E+00	2.2E+00	2.68E+00	p <b>Ci/L</b>	100.00%	RD3214	
BETA	4.20E+00	1.7E+00	1.7E+00	3.06E+00	pCi/L	. 100.00%	RD3214	
STRONTIUM	-4.76E-02 (	1.7E-01 ک	1.7E-01	7.54E-01	pC <b>i/</b> L	98.00%	RD3204	
TRITIUM	1.03E+03	1.8E+02	2.6E+02	2.93E+02	pCi/L	88.10%	RD3205	

Number of Results: 11

. 200 Am



LAB NAME:

ITAS-RICHLAND

SDG:

W0699

LAB SAMPLE ID:

50906102

**MATRIX:** 

WATER

CLIENT ID:

B0GJT2

DATE RECEIVED:

9/6/95 9:15:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER	
						-		
CO-58	-3.78E-03 (	ノ 5.2E-03	5.2E-03	8.57E-03	pCi/L	N/A	RD3219	
CO-60	-2.75E-03 (	ノ 3.9E-03	3.9E-03	6.35E-03	pCi/L	N/A	RD3219	
CS-137DA	-6.27E-05	J 5.0E-03	5.0E-03	8.91E-03	pCi/L	N/A	RD3219	
EU-152	-3.40E-04 (	J 1.1E-02	1.1E-02	1.92E-02	pCi/L	N/A	RD3219	
EU-154	-1.06E-03	び 1.2E-02	1.2E-02	2.39E-02	<b>pCl/L</b>	N/A	RD3219	
EU-155	-2.72E-04	レ 1.1E-02	1.1E-02	1.87E-02	pCVL	N/A	RD3219	
FE-59	1.04E-02	リ 9.6E-03	9.7E-03	2.30E-02	p <b>Ci/L</b>	N/A	RD3219	
ALPHA	2.01E+00	1.4E+00	1.4E+00	1.87E+00	pCi/L	100.00%	RD3214	
BETA	5.59E+00	1.8E+00	1.9E+00	3.09E+00	pC <b>i/</b> L	100.00%	RD3214	
STRONTIUM	1.47E-02	ノ 1.7E-01	1.7E-01	7.33E-01	pCi/L	97.10%	RD3204	
TRITIUM	3.81E+02	J 1.4E+02	2.1E+02	2.93E+02	pCi/L	88.10%	RD3205	

Number of Results: 11:

BBC 11/17/95

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LAB NAME:

ITAS-RICHLAND

SDG:

W0699

LAB SAMPLE ID:

50906103

MATRIX:

WATER

CLIENT ID:

**B0GJW0** 

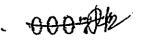
DATE RECEIVED:

9/6/95 9:15:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
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CO-58	6.38E+00 (	J 5.1E+00	5.1E+00	1.11E+01	p <b>Ci/L</b>	N/A	RD3219
CO-60	-5.09E-01	U 6.0E+00	6.0E+00	1.07E+01	p <b>Ci/L</b>	N/A	RD3219
CS-137DA	3.17E+00 (	3.1E+00	3.1E+00	6.83E+00	p <b>Ci/L</b>	N/A	RD3219
EU-152	1.39E+00 (	ノ 1.1E+01	1.1E+01	1.92E+01	pCi/L	N/A	RD3219
EU-154	-3.67E+00	U 1.5E+01	1.5E+01	2.77E+01	p <b>Ci/L</b>	N/A	RD3219
EU-155	-2.48E+00	<b>∪</b> 9.4E+00	9.4E+00	1.58E+01	pCi/L	N/A	RD3219
FE-59	-6.43E+00	U 1.4E+01	1.4E+01	2.42E+01	pCi/L	N/A	RD3219
ALPHA	0.00E+00	U 2.8E-01	2.8E-01	7.92E-01	pCi/L	100.00%	RD3214
BETA	1.85E+02	6.6E+00	1.5E+01	2.81E+00	pCi/L	100.00%	RD3214
STRONTIUM	8.53E+01	2.0E+00	2,2E+01	7.35E-01	pCi/L	96,90%	RD3204
TRITIUM	6.78E+04	J 1.1E+03	5.1E+03	2.93E+02	pCi/L	88,10%	RD3205

Number of Results: 11

PB (1/11/95





LAB NAME:

**ITAS-RICHLAND** 

SDG:

W0699

LAB SAMPLE ID:

50915401

**MATRIX:** 

WATER

CLIENT ID:

B0GJW4

DATE RECEIVED:

9/12/95 10:15:00 AM

	<u> </u>						
ISOTOPE		COUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
CO-58	-4.38E+00 U	5.6E+00	5.6E+00	8.89E+00	pCi/L	N/A	RD3219
CO-60	2.58E+00 C		4.0E+00	9.09E+00	pC <b>i/</b> L	N/A	RD3219
CS-137DA	-3.03E+00 C	4.3E+00	4.3E+00	6.69E+00	pCi/L	N/A	RD3219
EU-152	2.57E+00 (	ノ 1.2E+01	1.2E+01	2.05E+01	pCi/L	N/A	RD3219
EU-154	-1.50E+00 \	J 1.5E+01	1.5E+01	2.78E+01	p <b>Ci/L</b>	N/A	RD3219
EU-155	9.56E-01 (	) 1.1E+01	1.1E+01	1.82E+01	p <b>Ci/L</b>	N/A	RD3219
FE-59	1.17E+01 C	/ 1.3E+01	1.3E+01	2.64E+01	p <b>Ci/L</b>	N/A	RD3219
ALPHA	3.57E+00	1.2E+00	1.3E+00	9.76E-01	pCi/L	100.00%	RD3214
BETA	6.86E+00	1.8E+00	1.8E+00	2.81E+00	pCi/L	100.00%	RD3214
STRONTIUM	2.93E-01 (	) 2.1E-01	2.3E-01	7.64E-01	pCi/L	100.00%	RD3204
TRITIUM	4.22E+04	√ 8.6E+02	3.2E+03	2.93E+02	pCi/L	88.10%	RD3205

Number of Results: 11

215-1412/95



LAB NAME:

ITAS-RICHLAND

SDG:

W0699

LAB SAMPLE ID:

50917301

MATRIX:

WATER

CLIENT ID:

B0GJY2

DATE RECEIVED:

9/13/95 11:00:00 AM

							<u> </u>
ISOTOPE	CC0111 T	COUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
 		·····					
CO-58	0.00E+00 <i>∪</i>	4.2E+00	4.2E+00	8.00E+00	p <b>Ci/L</b>	N/A	RD3219
CO-60	1.88E+00 €	5.9E+00	5.9E+00	1.19E+01	pC <b>i/L</b>	N/A	RD3219
CS-137DA	-2.57E+00 U	4.5E+00	4.5E+00	7.38E+00	pCi/L	N/A	RD3219
EU-152	-3.46E+00 U	1.2E+01	1.2E+01	2.09E+01	pCi/L	N/A	RD3219
EU-154	1.12E+01 U	8.5E+00	8.6E+00	2.41E+01	pCi/L	N/A	RD3219
EU-155	-4.44E+00 U	1.3E+01	1.3E+01	2.11E+01	p <b>Ci/L</b>	N/A	RD3219
FE-59	-1.27E+01 \	1.1E+01	1.1E+01	1.58E+01	p <b>Ci/L</b>	N/A	RD3219
ALPHA	6.52E-01 ()	5.0E-01	5.1E-01	7.12E-01	p <b>Cl/</b> L	100.00%	RD3214
BETA	1.38E+03	1.8E+01	9.9E+01	2.93E+00	pC <b>i/</b> L	100.00%	RD3214
STRONTIUM	6.82E+02	5.6E+00	1.8E+02	7.81E-01	p <b>Ci/</b> L	97.80%	RD3204
TRITIUM	6.18E+04 J	1.0E+03	4.7E+03	2.93E+02	pCi/L	88.10%	RD3205

Number of Results: [11]

RBC ululas

C009#



LAB NAME:

ITAS-RICHLAND

SDG:

W0699

LAB SAMPLE ID:

50917302

MATRIX:

WATER

CLIENT ID:

B0GJV8

DATE RECEIVED:

9/13/95 11:00:00 AM

 ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER	
							,	
CO-58	-2.74E+00 (	ン 5.5E+00	5.5E+00	9.48E+00	pCi/L	N/A	RD3219	
CO-60	7.76E+00 (	5.4E+00	5.4E+00	1.29E+01	pCi/L	N/A	RD3219	
CS-137DA	-3.14E-01 (	) 4.7E+00	4.7E+00	8.50E+00	p <b>Ci/L</b>	N/A	RD3219	
EU-152	6.79E+00 (	ク <sub>9.6E+00</sub>	9.6E+00	1.89E+01	<b>pCVL</b>	N/A	RD3219	
EU-154	-1.59E+00	U 1.1E+01	1.1E+01	2.25E+01	p <b>Ci/L</b>	N/A	RD3219	
EU-155	1.63E+00	J 1.0E+01	1.0E+01	1.76E+01	p <b>C</b> i/L	N/A	RD3219	
FE-59	3.88E+00	J 1.1E+01	1.1E+01	2.23E+01	p <b>Cl/</b> L	N/A	RD3219	
ALPHA	2.98E-01 U	4.4E-01	4.4E-01	8.96E-01	pCi/L	100.00%	RD3214	
BETA	1.39E+03	1.8E+01	1.0E+02	2.85E+00	pCi/L	100.00%	RD3214	
STRONTIUM	6.78E+02	5.7E+00	1.8E+02	7.50E-01	pCI/L	97.10%	RD3204	
TRITIUM	6.19E+04	丁 1.0E+03	4.7E+03	2.93E+02	pCi/L	88.10%	RD3205	

Number of Results: 11

RBC Ulli1/95 - 0010Alex



LAB NAME:

ITAS-RICHLAND

SDG:

W0699

LAB SAMPLE ID:

50920701

MATRIX:

WATER

CLIENT ID:

B0GJX8

DATE RECEIVED:

9/14/95 10:00:00 AM

ISOTOPE		COUNTING RROR (2s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER	
CO-58	6.76E+00 ∪	3.9E+00	3.9E+00	9,22E+00	p <b>Ci/L</b>	N/A	RD3219	
CO-60	2.72E+00 U	4.7E+00	4.8E+00	1.02E+01	pCI/L	N/A	RD3219	
CS-137DA	1.31E+00 U	3.9E+00	3.9E+00	7.66E+00	p <b>Cl/</b> L	N/A	RD3219	
EU-152	-2.70E+00 U	1.0E+01	1.0E+01	1.75E+01	p <b>Ci/</b> L	N/A	RD3219	
EU-154	0.00E+00 U	1.1E+01	1.1E+01	2.19E+01	p <b>Ci/L</b>	N/A	RD3219	
EU-155	4.15E+00 U	8.0E+00	8. <b>0</b> E+00	1.43E+01	p <b>Ci/L</b>	N/A	RD3219	
FE-59	3.01E+00 €	8.3E+00	8.3E+00	1.71E+01	р <b>Сі/</b> L	N/A	RD3219	
ALPHA	1.44E+00 U	1.4E+00	1.4E+00	2.23E+00	pCi/L	100.00%	RD3214	
BETA	8.25E+02 *	1.4E+01	5.9E+01	3.17E+00	p <b>Ci/L</b>	100.00%	RD3214	
STRONTIUM	3.99E+02	5.0E+00	9.4E+01	1.04E+00	pCi/L	68.90%	RD3204	
TRITIUM	6.17E+03 🏅	3.5E+02	6.2E+02	2.93E+02	pC <b>i/</b> L	88.10%	RD3205	

Number of Results: 11

RBC 11/17/95

C0174



LAB NAME:

**ITAS-RICHLAND** 

SDG:

W0699

LAB SAMPLE ID:

50920702

MATRIX:

WATER

CLIENT ID:

B0GJX4

DATE RECEIVED:

9/14/95 10:00:00 AM

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 ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
00.50	7 105 00	11 0 0F:00	0.05.00	4.00=.04	-0:#	A1/A	RD3219
CO-58	-7.48E-02	U 6.0E+00	6.0E+00	1.09E+01	pCi/L	N/A	KD3219
CO-60	2.50E+00	U 4.1E+00	4.1E+00	9.28E+00	pCi/L	N/A	RD3219
CS-137DA	3.93E+00	U 4.1E+00	4.1E+00	8.18E+00	pCi/L	N/A	RD3219
EU-152	6.94E-01	U 1.2E+01	1.2E+01	2.12E+01	pCi/L	N/A	RD3219
EU-154	1.49E+01	U 1.3E+01	1.3E+01	3.17E+01	p <b>Ci/L</b>	N/A	RD3219
EU-155	-4.49E+00	U 8.3E+00	8.3E+00	1.39E+01	pCl/L	N/A	RD3219
FE-59	0.00E+00	U 8.4E+00	8.4E+00	1.68E+01	pCi/L	N/A	RD3219
ALPHA	-5.01E-02	U 1.6E-01	1.6E-01	5.39E-01	pCi/L	100.00%	RD3214
BETA	1.72E+00	U 1.3E+00	1.4E+00	2.69E+00	pCi/L	100.00%	RD3214
STRONTIUM	1.14E-01	U 1.9E-01	2.0E-01	7.68E-01	pCi/L	90.40%	RD3204
TRITIUM	8.18E+00	UJ1.2E+02	1.9E+02	2.93E+02	pCi/L	88.10%	RD3205
				•			

Number of Results: 11

PBC.

-6012(P4)



LAB NAME:

**ITAS-RICHLAND** 

SDG:

W0699

LAB SAMPLE ID:

50920703

MATRIX:

WATER

CLIENT ID:

**BOGJVO** 

DATE RECEIVED:

9/14/95 10:00:00 AM

ISOTOPE		COUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
CO-58	-3.66E+00 ∪	5.9E+00	6.0E+00	9.61E+00	pCi/L	N/A	RD3219
CO-60	3.34E+00 U	4.1E+00	4.1E+00	9.33E+00	p <b>Cl/L</b>	N/A	RD3219
CS-137DA	2.41E+00 U	4.8E+00	4.8E+00	9.11E+00	<b>pCVL</b>	N/A <sup>*</sup>	RD3219
EU-152	6.82E+00 ∪	1.1E+01	1.1E+01	2.16E+01	p <b>Ci/</b> L	N/A	RD3219
EU-154	-1.67E+01 U	1.7E+01	1.7E+01	2.72E+01	pCi/L	N/A	RD3219
EU-155	4.05E+00 U	9.2E+00	9.2E+00	1.65E+01	pCi/L	N/A	RD3219
FE-59	1.28E+00 U	1.1E+01	1.1E+01	2.05E+01	<b>PCVL</b>	N/A	RD3219
ALPHA	1.63E+00 U	1.6E+00	1.6E+00	2.65E+00	pCi/L	100.00%	RD3214
BETA	8.13E+02	1.4E+01	5.9E+01	2.95E+00	pCi/L	100.00%	RD3214
STRONTIUM	3.94E+02	4.7E+00	9.6E+01	8.57E-01	pCI/L	80.00%	RD3204
TRITIUM	6.55E+03 J	3.6E+02	6.5E+02	2.93E+02	pCi/L	88.10%	RD3205

Number of Results: 11

RBC 11/17/95

0013/2



LAB NAME:

ITAS-RICHLAND

SDG:

W0699

LAB SAMPLE ID:

50924001

MATRIX:

WATER

CLIENT ID:

BOGJS8

DATE RECEIVED:

9/15/95 10:00:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
CO-58	-3.17E+00\	5.1E+00	5.1E+00	8.51E+00	pCi/L	N/A	RD3219
CO-60	7.36E-01 (	ノ 4.8E+00	4.8E+00	9.61E+00	pCi/L	N/A	RD3219
CS-137DA	-3.99E-01 (	J 5.4E+00	5.4E+00	8.89E+00	pCi/L	N/A	RD3219
EU-152	-8.68E+00	U 1.3E+01	1.3E+01	1.92E+01	pCi/L	N/A	RD3219
EU-154	3.49E+00 (	J 1.3E+01	1.3E+01	2.71E+01	pCi/L	N/A	RD3219
EU-155	-3.82E+00	Ú 1.1E+01	1.1E+01	1.69E+01	pCi/L	N/A	RD3219
FE-59	-3.54E+00	<b>Ú</b> 1.2E+01	1.2E+01	2.08E+01	pCi/L	N/A	RD3219
ALPHA	3.30E+00	2.2E+00	2.2E+00	2.96E+00	pCi/L	100.00%	RD3214
BETA	1.09E+01	2.1E+00	2.3E+00	2.99E+00	pCi/L	100.00%	RD3214
STRONTIUM	7.87E-01	ン 3.1E-01	3.6E-01	9.55E-01	pCi/L	71.20%	RD3204
TRITIUM	1.23E+03	J 1.9E+02	2.7E+02	2.93E+02	pCi/L	88.10%	RD3205

Number of Results: 11

RBC Wirlas

-<del>6014/2</del>



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50925901

**MATRIX:** 

WATER

CLIENT ID:

**BOGJW6** 

DATE RECEIVED: 9/18/95 11:20:00 AM

ISOTOPE	22 CALL TO	COUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
CO-58,	8.23E-02 <i>U</i>	5.6E+00	5.6E+00	1.04E+01	pCi/L	N/A	RD3219
CO-60.	-3.08E+00U		4.4E+00	7.12E+00	pCi/L	N/A	RD3219
CS-137DA.	2.26E+00U	3.4E+00	3.4E+00	7.21E+00	pCv/L	N/A	RD3219
EU-152.	6.14E-01V	1.0E+01	1.0E+01	1.84E+01	pCi/L	N/A	RD3219
EU-154.	7.54E-01U	1.4E+01	1.4E+01	2.69E+01	pCi/L	N/A	RD3219
EU-155.	-2.31E+00U	7.7E+00	7.7E+00	1.26E+01	pC <b>i/</b> L	N/A	RD3219
FE-59.	4.13E+00U	1.1E+01	1.1E+01	2.40E+01	pCI/L	N/A	RD3219
ALPHA	4.20E-01U	3.4E-01	3.5E-01	5.11E-01	pCi/L	100.00%	RD3214
BETA	2.79E+00	1.4E+00	1.5E+00	2.72E+00	pCi/L	100.00%	RD3214
STRONTIUM	9.87E-02 U	1.7E-01	1.7E-01	8.16E-01	pCi/L	94.20%	RD3204
TRITIUM	6.58E+01U	T 1.3E+02	2.0E+02	2.99E+02	pCi/L	88.10%	RD3205

Number of Results: [11]

11/29/95 -6000005/16/



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50925902

MATRIX:

WATER

CLIENT ID:

B0GJX2

DATE RECEIVED:

9/18/95 11:20:00 AM

CO-58.	-4.77E+00U	6.2E+00	6 25:00				
CO 60	4 425400()		6.2E+00	1.02E+01	pCi/L	N/A	RD3219
CO-60.	4.13ETUUV	5.4E+00	5.4E+00	1.18E+01	pCi/L	N/A	RD3219
CS-137DA.	2.32E+00ひ	3.6E+00	3.6E+00	7.61E+00	pCi/L	N/A	RD3219
EU-152.	4.38E+00U	1.3E+01	1.3E+01	2.29E+01	pCi/L	N/A	RD3219
EU-154.	7.96E+00U	7.1E+00	7.2E+00	2.09E+01	p <b>Ci/L</b>	N/A	RD3219
EU-155.	9.88E+00 U	6.7E+00	6.8E+00	1.34E+01	<b>pCi/L</b>	N/A	RD3219
FE-59.	5.85E+00V	1.2E+01	1.2E+01	2.56E+01	p <b>Ci/L</b>	N/A	RD3219
ALPHA	4.76E-01U	3.6E-01	3.7E-01	5.17E-01	p <b>Ci</b> /L	100.00%	RD3214
BETA	1.68E+00	) 1.3E+00	1.3E+00	2.69E+00	p <b>Ci/</b> L	100.00%	RD3214
STRONTIUM	-1.25E-03U	1.9E-01	1.9E-01	9.51E-01	pCi/L	80.30%	RD3204
TRITIUM	4.62E+01	<b>近</b> 1.3E+02	2.0E+02	2.99E+02	pCi/L	88.10%	RD3205

Number of Results: 11

PBC (1/29/95 -C00000 P/Ke



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50925903

MATRIX:

WATER

CLIENT ID:

**BOGHX7** 

DATE RECEIVED:

9/18/95 11:20:00 AM

 ISOTOPE		OUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER-	
CO-58.	7.74E-01U	4.7E+00	4.7E+00	9.08E+00	pCi/L	N/A	RD3219	
CO-60.	-2.05E+00U	6.6E+00	6.6E+00	1.15E+01	pCi/L	N/A	RD3219	
CS-137DA.	5.48E+00U	4.2E+00	4.2E+00	9.18E+00	pCi/L	N/A	RD3219	
EU-152.	-9.76E+00U	1.2E+01	1.2E+01	1.78E+01	pC <b>i/</b> L	N/A	RD3219	
EU-154.	3.94E+00V	9.7E+00	9.7E+00	2.22E+01	pCi/L	N/A	RD3219	
EU-155.	3.53E+00U	9.6E+00	9.6E+00	1.69E+01	pCi/L	N/A	RD3219	
FE-59.	-9.43E+00U	1.5E+01	1.6E+01	2,63E+01	<b>₽Ci/L</b>	N/A	RD3219	
STRONTIUM	9.52E+02	6.8E+00	2.7E+02	9.06E-01	pCi/L	77.70%	RD3204	
TRITIUM	2.09E+04 J	6.1E+02	1.7E+03	2.99E+02	pCi/L	88.10%	RD3205	

Number of Results: 19

Phc 11/29/95

C000007 RBC



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50925904

MATRIX:

WATER

CLIENT ID:

B0GJW2

DATE RECEIVED:

9/18/95 11:20:00 AM

ISOTOPE		OUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
CO-58.	7.19E-01 U	6.0E+00	6.0E+00	1.14E+01	p <b>Çi/</b> L	N/A	RD3219
CO-60.	3.62E+00U	3.0E+00	3.0E+00	8:51E+00	pCi/L	N/A	RD3219
CS-137DA.	-3.10E-01U	3.7E+00	3.7E+00	6.81E+00	pCi/L	N/A	RD3219
EU-152.	1.76E+00 U	9.1E+00	9.1E+00	1.62E+01	pCi/L	N/A	RD3219
EU-154.	4.62E+00 U	8.7E+00	8.7E+00	2.14E+01	pCi/L	N/A	RD3219
EU-155.	4.02E+00U	1.1E+01	1.1E+01	2.00E+01	p <b>Ci/L</b>	N/A	RD3219
FE-59.	5.02E+00 U	1.4E+01	1.4E+01	2.78E+01	pCi/L	N/A	RD3219
ALPHA	2.14E+00 U	2.0E+00	2.0E+00	3.29E+00	pCl/L	100.00%	RD3214
BETA	6.63E+00	1.9E+00	1.9E+00	3.07E+00	pCi/L	100.00%	RD3214
STRONTIUM	1.09E-01 U	1.7E-01	1.7E-01	7.97E-01	pCi/L	97.10%	RD3204
TRITIUM	6.28E+02J	1.6E+02	2.4E+02	2.99E+02	pCi/L	88.10%	RD3205

Number of Results: [11]

600000 MA



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50926701

**MATRIX:** 

WATER

CLIENT ID:

B0GJV6

DATE RECEIVED: . 9/19/95 11:40:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBÉR
CO-58.	-9.67E-01 <sup>U</sup>	5.1E+00	5.2E+00	9.35E+00	p <b>Ci/L</b>	N/A	RD3219
CO-60.	-2.02E+00V	6.8E+00	6.8E+00	1.17E+01	p <b>Ci/L</b>	N/A	RD3219
CS-137DA.	-2.56E+00\	4.8E+00	4.8E+00	8.05E+00	p <b>Ci/</b> L	N/A	RD3219
EU-152.	6.37E+00 V	1.1E+01	1.1E+01	2.03E+01	pCl/L	N/A	RD3219
EU-154.	2.74E+00 C	1.1E+01	1.1E+01	2.22E+01	p <b>Ci/L</b>	N/A	RD3219
EU-155.	4.45E+00 \	) 1.1E+01	1.1E+01	1.93E+01	pCi/L	N/A	RD3219
FE-59.	1.93E+00 C	1.3E+01	1.3E+01	2.46E+01	pCi/L	N/A	RD3219
ALPHA	6.02E-01	5.4E-01	5.5E-01	8.50E-01	p <b>Ci/L</b>	100.00%	RD3214
BETA	6.08E+00	1.7E+00	1.8E+00	2.85E+00	pCi/L	100.00%	RD3214
STRONTIUM	7.31E-02	1.6E-01	1.6E-01	7.82E-01	pCi/L	99.60%	RD3204
TRITIUM	3.22E+04	7.5E+02	2.5E+03	2.99E+02	pCi/L	88.10%	RD3205

Number of Results: [11]

C000000 \$160



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50926702

MATRIX:

WATER

CLIENT ID:

B0GJY0

**DATE RECEIVED:** 

9/19/95 11:40:00 AM

ISOTOPE		OUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
CO-58.	2.27E+00♥	4.9E+00	4.9E+00	1.01E+01	pCi/L	N/A	RD3219
CO-60.	9.39E+00 <b>U</b>	4.7E+00	4.8E+00	1.25E+01	pCi/L	N/A	RD3219
. CS-137DA.	-3.44E+00U	5.2E+00	5.2E+00	8.45E+00	pCi/L	N/A	RD3219
EU-152.	1.64E+01V	1.0E+01	1.0E+01	2.05E+01	p <b>Ci/</b> L	N/A	RD3219
EU-154.	1.03E+01 <b>U</b>	1.2E+01	1.2E+01	2.74E+01	pCi/L	N/A	RD3219
EU-155.	6.23E+00 <b>U</b>	8.1E+00	8.1E+00	1.48E+01	p <b>Ci/</b> L	N/A	RD3219
FE-59.	1.39E+00 <b>U</b>	1.1E+01	1.1E+01	2.17E+01	pCi/L	N/A	RD3219
ALPHA	7.82E-01 <b>V</b>	6.6E-01	6.7E-01	1.09E+00	p <b>Ci/L</b>	100.00%	RD3214
BETA	6.84E+00	1.8E+00	1.9E+00	2.88E+00	p <b>Ci/</b> L	100.00%	RD3214
STRONTIUM	6.96E-02U	1.7E-01	1.7E-01	8.27E-01	pCi/L	93.20%	RD3204
TRITIUM	3.30E+04 <b>T</b>	7.6E+02	2.6E+03	2.99E+02	pCi/L	88.10%	RD3205

Number of Results: [11]

RBC 11/28/95

-C000010P/lec

000134



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50931901

MATRIX:

WATER

CLIENT ID:

B0GJW8

DATE RECEIVED:

9/21/95 9:35:00 AM

SECTION T		TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
						55554
-3.55E+00 <sup>O</sup>	5.2E+00	5.3E+00	8.64E+00	pCi/L	N/A	RD3219
-2.85E-01U	4.0E+00	4.0E+00	8.16E+00	pCi/L	N/A	RD3219
2.52E+00U	5.2E+00	5.2E+00	9.76E+00	pCi/L	N/A	RD3219
-4.30E+00U	1.3E+01	1.3E+01	2.10E+01	pCi/L	N/A	RD3219
-7.96E+00U	1.5E+01	1.5E+01	2.62E+01	pCi/L	N/A	RD3219
-5.37E-01U	1.2E+01	1.2E+01	1.89E+01	pCi/L	N/A	RD3219
2.64E+00U	1.4E+01	1.4E+01	2.57E+01	pÇi/L	N/A	RD3219
1.71E-01U	2.6E-01	2.6E-01	5.13E-01	pCi/L	100.00%	RD3214
-5.47E-02 U	1.2E+00	1.2E+00	2.72E+00	pCi/L	100.00%	RD3214
1.07E-01 V	2.0E-01	2.0E-01	9.28E-01	, pCi/L	86.80%	RD3204
1.05E+02 <b>∪</b> .	J1.3E+02	2.0E+02	2.99E+02	pCi/L	88.10%	RD3205
	-3.55E+00 <sup>U</sup> -2.85E-01 <sup>U</sup> 2.52E+00 <sup>U</sup> -4.30E+00 <sup>U</sup> -7.96E+00 <sup>U</sup> -5.37E-01 <sup>U</sup> 2.64E+00 <sup>U</sup> 1.71E-01 <sup>U</sup> -5.47E-02 <sup>U</sup> 1.07E-01 <sup>U</sup>	-3.55E+00 <sup>U</sup> 5.2E+00 -2.85E-01 <sup>U</sup> 4.0E+00 2.52E+00 <sup>U</sup> 5.2E+00 -4.30E+00 <sup>U</sup> 1.3E+01 -7.96E+00 <sup>U</sup> 1.5E+01 -5.37E-01 <sup>U</sup> 1.2E+01 2.64E+00 <sup>U</sup> 1.4E+01 1.71E-01 <sup>U</sup> 2.6E-01 -5.47E-02 <sup>U</sup> 1.2E+00	RESULT ERROR (2s) ERROR (2s)  -3.55E+00 <sup>U</sup> 5.2E+00 5.3E+00  -2.85E-01 <sup>U</sup> 4.0E+00 4.0E+00  2.52E+00 <sup>U</sup> 5.2E+00 5.2E+00  -4.30E+00 <sup>U</sup> 1.3E+01 1.3E+01  -7.96E+00 <sup>U</sup> 1.5E+01 1.5E+01  -5.37E-01 <sup>U</sup> 1.2E+01 1.2E+01  2.64E+00 <sup>U</sup> 1.4E+01 1.4E+01  1.71E-01 <sup>U</sup> 2.6E-01 2.6E-01  -5.47E-02 <sup>U</sup> 1.2E+00 1.2E+00  1.07E-01 <sup>U</sup> 2.0E-01 2.0E-01	RESULT ERROR (2s) ERROR (2s) MDA  -3.55E+00♥ 5.2E+00 5.3E+00 8.64E+00  -2.85E-01♥ 4.0E+00 4.0E+00 8.16E+00  2.52E+00♥ 5.2E+00 5.2E+00 9.76E+00  -4.30E+00♥ 1.3E+01 1.3E+01 2.10E+01  -7.96E+00♥ 1.5E+01 1.5E+01 2.62E+01  -5.37E-01♥ 1.2E+01 1.2E+01 1.89E+01  2.64E+00♥ 1.4E+01 1.4E+01 2.57E+01  1.71E-01♥ 2.6E-01 2.6E-01 5.13E-01  -5.47E-02♥ 1.2E+00 1.2E+00  1.07E-01♥ 2.0E-01 9.28E-01	RESULT ERROR (2s) ERROR (2s) MDA UNIT  -3.55E+00U 5.2E+00 5.3E+00 8.64E+00 pCi/L  -2.85E-01U 4.0E+00 4.0E+00 8.16E+00 pCi/L  2.52E+00U 5.2E+00 5.2E+00 9.76E+00 pCi/L  -4.30E+00U 1.3E+01 1.3E+01 2.10E+01 pCi/L  -7.96E+00U 1.5E+01 1.5E+01 2.62E+01 pCi/L  -5.37E-01U 1.2E+01 1.2E+01 1.89E+01 pCi/L  2.64E+00U 1.4E+01 1.4E+01 2.57E+01 pCi/L  1.71E-01U 2.6E-01 2.6E-01 5.13E-01 pCi/L  -5.47E-02 U 1.2E+00 1.2E+00 2.72E+00 pCi/L  1.07E-01U 2.0E-01 2.0E-01 9.28E-01 pCi/L	RESULT ERROR (2s) ERROR (2s) MDA UNIT YIELD  -3.55E+00♥ 5.2E+00 5.3E+00 8.64E+00 pCi/L N/A  -2.85E-01♥ 4.0E+00 4.0E+00 8.16E+00 pCi/L N/A  2.52E+00♥ 5.2E+00 5.2E+00 9.76E+00 pCi/L N/A  -4.30E+00♥ 1.3E+01 1.3E+01 2.10E+01 pCi/L N/A  -7.96E+00♥ 1.5E+01 1.5E+01 2.62E+01 pCi/L N/A  -5.37E-01♥ 1.2E+01 1.2E+01 1.89E+01 pCi/L N/A  2.64E+00♥ 1.4E+01 1.4E+01 2.57E+01 pCi/L N/A  1.71E-01♥ 2.6E-01 2.6E-01 5.13E-01 pCi/L N/A  -5.47E-02♥ 1.2E+00 1.2E+00 2.72E+00 pCi/L 100.00%  1.07E-01♥ 2.0E-01 2.0E-01 9.28E-01 pCi/L 86.80%

Number of Results: [11]

11/29/15 C0000111



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50931902

**MATRIX:** 

WATER

CLIENT ID:

B0GJX6

DATE RECEIVED:

9/21/95 9:35:00 AM

***************************************	ISOTOPE	252111	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD. NUMBER	
	CO-58.	-4.32E+00U	5.0E+00	5.0E+00	8.22E+00	p <b>Ci/</b> L	N/A	RD3219	
	CO-60.	4.95E-01U	2.7E+00	2.7E+00	6.69E+00	p <b>Ci/</b> L	N/A	RD3219	
•	CS-137DA.	2.32E+00U	4.4E+00	4.4E+00	8.67E+00	p <b>Ci/</b> L	N/A	RD3219	
	EU-152.	8.65E+00 <b>U</b>	9.3E+00	9.4E+00	1.89E+01	pCi/L	N/A	RD3219	
	EU-154.	1.07E+00 <i>U</i>	9.8E+00	9.8E+00	2.11E+01	pCi/L	N/A	RD3219	
	EU-155.	1.72E+00 <b>U</b>	1.1E+01	1.1E+01	1.83E+01	pCi/L	N/A	RD3219	
	FE-59.	-9.90E+00 <b>V</b>	1.3E+01	1.3E+01	2.06E+01	pCi/L	N/A	RD3219	
	ALPHA	-3.02E-02 <i>U</i>	2.2E-01	2.2E-01	6.38E-01	pÇi/L	100.00%	RD3214	
	BETA	1.58E+00U	1.3E+00	1.4E+00	2.73E+00	pCi/L	100.00%	RD3214	
	STRONTIUM	-4.27E-02U	1.7E-01	1.7E-01	9.02E-01	pCi/L	81.80%	RD3204	
	TRITIUM	6.78E+01U	了 <sub>1.3E+02</sub>	2.0E+02	2.99E+02	pC <b>i/</b> L	88.10%	RD3205	

Number of Results: [11]

R/19 < (1/28/15 -6000012/11/11



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50931903

**MATRIX:** 

WATER

CLIENT ID:

B0GJX0

DATE RECEIVED:

9/21/95 9:35:00 AM

ISOTOPE		COUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER	
CO-58.	2.84E+00 <b>U</b>	4.3E+00	4.3E+00	9.19E+00	pCi/L	N/A	RD3219	
CO-60.	4.17E+00V	3.2E+00	3.2E+00	8.94E+00	pCi/L	N/A	RD3219	
CS-137DA.	-5.77E+00℃	5.6E+00	5.6E+00	7.91E+00	pCi/L	N/A	RD3219	
EU-152.	-1.55E+00U	1.2E+01	1.2E+01	2.16E+01	pCI/L	N/A	RD3219	
EU-154.	9.65E+00U	7.9E+00	7.9E+00	2.27E+01	p <b>Ci/L</b>	N/A	RD3219	
EU-155.	3.97E+00U	7.3E+00	7.3E+00	1.36E+01	pCi/L	N/A	RD3219	
FE-59.	1.37E+01U	8.7E+00	8.8E+00	2.39E+01	pCi/L	N/A	RD3219	
ALPHA	1.21E-01 <b>U</b>	2.4E-01	2.4E-01	5.13E-01	pCi/L	100.00%	RD3214	
BETA	1.95E+00 <i>U</i>	1.4E+00	1.4E+00	2.69E+00	p <b>Ci/L</b>	100.00%	RD3214	
STRONTIUM	9.00E-02 U	1.9E-01	1.9E-01	9.15E-01	pCi/L	86.10%	RD3204	
TRITIUM	4.77E+01 U	J 1.3E+02	2.0E+02	2.99E+02	pCi/L	88.10%	RD3205	

Number of Results: [11]

C000018/22



LAB NAME:

ITAS-RICHLAND

SDG:

W0721

LAB SAMPLE ID:

50931904

**MATRIX:** 

WATER

CLIENT ID:

B0GJV2

DATE RECEIVED:

9/21/95 9:35:00 AM

	ISOTOPE		COUNTING RROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER	
7744	<del></del>								
	CO-58.	1.31E+00U	6.1E+00	6.1E+00	1.13E+01	pCi/L	N/A	RD3219	
	CO-60.	5.48E+00U	5.5E+00	5.5E+00	1.22E+01	pCi/L	N/A	RD3219	
	CS-137DA.	-2.79E+00U	5.6E+00	5.6E+00	8.59E+00	pCi/L	N/A	RD3219	
	EU-152.	-5.35E+00 <i>U</i>	1.3E+01	1.3E+01	2.04E+01	pCi/L	N/A	RD3219	
	EU-154.	-8.31E+00 <i>U</i>	1.7E+01	1.7E+01	2.92E+01	p <b>Ci/L</b>	N/A	RD3219	
	EU-155.	-2.45E+00V	1.1E+01	1.1E+01	1.75E+01	pCi/L	N/A	RD3219	
	FE-59.	-4.68E+00U	1.6E+01	1.6E+01	2.76E+01	pCi/L	N/A	RD3219	
	ALPHA	5.64E+00J	2.4E+00	2.4E+00	2.34E+00	pCi/L	100.00%	RD3214	
	BETA	1.09E+01	2.1E+00	2.3E+00	3.06E+00	pCi/L	100.00%	RD3214	
	STRONTIUM	7.95E-02U	2.0E-01	2.0E-01	9.76E-01	pCi/L	78.40%	RD3204	
	TRITIUM	1.27E+04 J	4.8E+02	1.1E+03	2.99E+02	pCi/L	88.10%	RD3205	

Number of Results: [11]

RBC 11/29/95 0000014/12

#### RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample 10: BOGJY4

LAL Sample ID: L5379-12

Date Collected: 14-SEP-95

Date Received: 16-SEP-95

Matrix:

Water

Login Number: L5379

Ac-228(Ra-228)	16-0CT-95	GANNA SPEC LAL-0063 27809	5. <b>Ú</b>	22.	48.		pCi/
Co-58	16-0CT-95	GANNA SPEC LAL-0063 27809	2.5	5.7	9.6		pCi/
Co-60	16-0CT-95	GANNA SPEC LAL-0063 27809	-0.5	1.5	12.		pCi/
Cs-137	16-0CT-95	GANNA SPEC LAL-0063 27809	4.1	7.3	9.4		pCi/
Eu-152	16-0CT-95	GANNA SPEC LAL-0063 27809	-4.0	8.1	<del>3</del> 6.		pCi/
Eu-154	16-0CT-95	GANNA SPEC LAL-0063 27809	-6.7	4.2	34.		pCi/
Eu-155	16-0CT-95	GANNA SPEC LAL-0063 27809	6.	13.	18.		pCi,
Fe-59	16-0CT-95	GANNA SPEC LAL-0063 27809	-1.3	9.0	27.	•	pCi/
Pb-212	16-OCT-95	GANNA SPEC LAL-0063 27809	4.7	9.4	13.		pCi,
Pb-214(Ra-226)	16-0CT-95	GANNA SPEC LAL-0063 27809	-3.5	8.4	17.		pCi,
Ra-226(GAMMA)	16-0CT-95	GANNA SPEC LAL-0063 27809	-110	100	160		pCi,
Ru-106	16-0CT-95	GANNA SPEC LAL-0063 27809	-20.	39.	74.		pCi,
U-235(GAMMA)	16-0CT-95	GANNA SPEC LAL-0063 27809	-5.	26.	41.		pCi.
Gross Alpha	11-0CT-95	GR ALP/BETA LAL-0060 27812	1.8 34	3.2	5.8	C	pCi,
Gross Beta	11-OCT-95	GR ALP/BETA LAL-0060 27812	7.9	3.4	5.1	C	- pCi
Total radio-strontium	20-SEP-95	SR-90 LAL-0196 27451	0.67 ()	0.61	1.0		pCi/

#### RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: 80GJY4

LAL Sample ID: L5379-20

Date Collected: 14-SEP-95

Date Received: 16-SEP-95

**Matrix:** 

Water

Login Number: L5379

Constituent	finalyzed.	Batch	× ALTON	/ Error	NOA	DataQual Units
H-3	02-oct-95	TRITIUM(H3) LAL-0066_27851	1360	360	320	pCi/L

12/1/95 -08 de